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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION 10

1200 Sixth Avenue Seattle, WA 98101

Reply To Attn Of: OW-134

JUL 1 8 2000

David Mabe, Administrator State Water Quality Programs Idaho Division of Environmental Quality 1410 N. Hilton Boise, Idaho 83706-1255

Re:

Middle Fork Payette River Sub-basin Assessment and TMDL (HUC: 17050121)

Dear Mr. Mabe:

The U.S. Environmental Protection Agency (EPA) is pleased to approve the Middle Fork Payette River TMDL submitted to us on December 31, 1998, as revised on December 23, 1999, for the following parameters:

<u>Waterbody</u>

<u>Segment</u>

<u>Parameter</u>

Middle Fork Payette River

Big Bulldog Creek to SF Payette River

sediment

We look forward to implementation of the TMDL, and continuing to work collaboratively on water quality issues in the Middle Fork Payette watershed.

By EPA's approval, this TMDL is now incorporated into the State's Water Quality Management Plan under Section 303(e) of the Clean Water Act. If you have any comments or questions, please feel free to call me at (206) 553-1261, or you may call Leigh Woodruff of my staff at (208) 378-5774.

Sincerely,

Randall F. Smith

Director

Office of Water

cc: Michael McIntyre, IDEQ
Don Essig, IDEQ
Steve West, IDEQ



1410 North Hillon, Bosse, ID 83706-1255, (208) 373-0502

Philip E. Balt. Governor

31 December 1998

Randall Smith, Director
Office of Water
United States Environmental Protection Agency, Region 10
1200 Sixth Avenue
Seattle, WA 98101

Dear Mr. Smith:

Enclosed you will find the Middle Fork Payette River Sub-basin Assessment and Total Maximum Daily Load (TMDL). The required public comment response has been included as Appendix C. This constitutes a formal submission to the United States Environmental Protection Agency of the Middle Fork Payette River TMDL in accordance with the State of Idaho Eight (8) Year TMDL Schedule, the Clean Water Act, Idaho state water quality standards, and Idaho Title 39, Chapter 36 et seq.

The Division of Environmental Quality feels that the Middle Fork Payette River TMDL, as it is currently constituted, meets all the necessary criteria under §303(d) of the Federal Clean Water Act as a total maximum daily sediment load for the Middle Fork Payette River. Therefore, this document is submitted for your approval. The following list provides a guide to sections of this TMDL which address the required elements as identified by Bruce Cleland in a November 19, 1997, meeting between the IDEQ and EPA.

1) Applicable Water Quality Standards: Sections 2.2 and 2.3

2) Loading Capacity: Section 3.2

3) Source Identification: Sections 2.3 and 3.2

4) Technical Assessment: Section 3.2 5) Allocations: Section 3.2

6) Margin of Safety: Section 3.2

7) Public Participation: Sections 4 and 5

Sub-basin Assessment and Total Maximum Daily Load for the Middle Fork Payette River

Boise Regional Office Idaho Division of Environmental Quality December 1998

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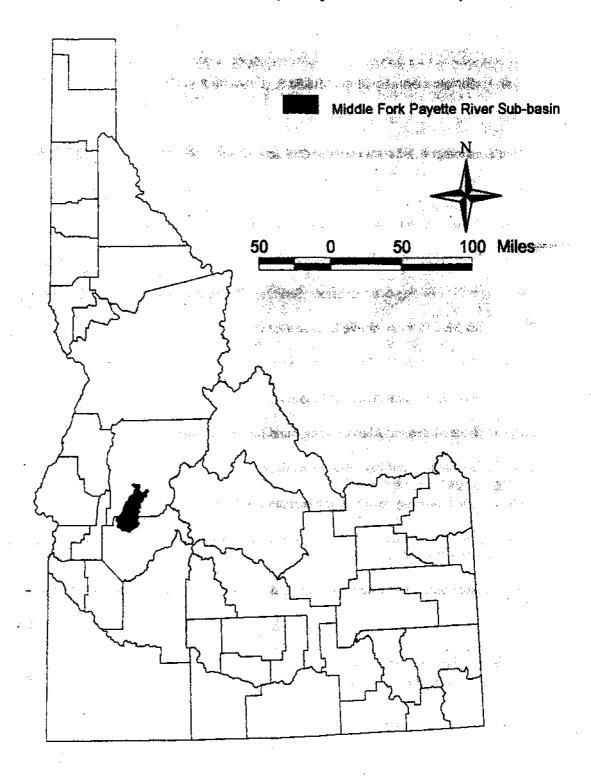


Figure 1: Middle Fork Payette River Location Map

2. Sub-basin Assessment

2.0. Middle Fork Payette Water Quality at a Glance

Water Quality at a Glance:	
Hydrologic Unit Code 17050121	Middle Fork Payetta Bleer Hydrologic Unit
Water Quality-Limited Segment	
MF Payette River from Bulldog Creek to Mouth	
Beneficial Uses Affected ColdWater Biota	
Pollutant of Concern Sediment	
Known Land Uses Forestry, Agriculture, Urban	
	Idaho -

2.1. Characterization of Watershed

The Middle Fork Payette River is located in central Idaho, about 64 km (40 mi) north of Boise. The Middle Fork Payette river generally flows south, south-west, through the town of Crouch, ID. The South Fork Payette joins the Middle Fork downstream of the town of Crouch to form the main stem of the Payette River. The Payette River then flows generally westward until Banks, ID, where the North Fork Payette River joins it. From Banks the Payette River flows west and south-west through the Idaho communities of Horseshoe Bend, Emmett, Payette until it reaches the Snake River near Ontario, OR.

2.1.1. Physical and Biological Characteristics

2.1.1.1. Climate

The Middle Fork Payette River basin is located in the Northern Rocky Mountain physiographic province at the western edge of the Salmon River Mountains. Local climate is characterized as continental with occasional maritime weather mass intrusions. The annual weather cycle consists of cold winters and warm summers where gradual changes of season are marked by rapid changes in weather.

During the winter and early spring months warm, humid air masses can enter the region causing rapid snow melt which, when combined with rainfall, create saturated soil conditions and high stream flow events. These climatic events, also called rain-on-snow events, occur periodically and can trigger large and/or numerous landslides. A large rain-on-snow event during the winter of 1997 resulted in numerous landslides within much of the Middle Fork Payette River basin. These recent landslides greatly influence the current sediment load within the basin.

The nearest long-term temperature and precipitation monitoring stations are located at Garden Valley,

Lowman, and Deadwood Summit. The weather stations located at Garden Valley and Lowman have a period of record from 1948 to present. Deadwood Summit weather station has a period of record from 1936 to present.

As typical for mountainous, continental climates, the Middle Fork Payette has warm summer days and cool nights. Summer thunderstorms are often intense events accompanied by heavy rainfall, hail, and lightning. Night-time temperatures can be below freezing beginning in September. Winter days and nights are cold with snowfall beginning in late-October and lasting through March. Average monthly maximum daily temperatures range from 0.6°C (33 °F) in January to 34°C (93 °F) in July, while average monthly minimums range from -8°C (18 °F) in January to 9°C (48 °F) in July at elevations of 975 meters (3200 feet). Mean temperatures average 5 °C (9 °F) cooler at elevations above 1615 meters (5300 feet) and 7°C (13 °F) cooler at elevations above 2000 meters (6562 feet). The snowfall accounts for about 60% of the annual precipitation.

Climatic conditions within the Middle Fork Payette were estimated using linear relationships derived from average annual data collected at these three stations (IDEQa, 1998). The following list summarizes the basic climatic characteristics representative of the high (2091 meters, 6860 feet), middle (1212 meters, 3976 feet), and low (978 meters, 3208 feet) elevation portions of the watershed:

Table 1: Climate Summary of the Middle Fork Payette River

•	Average Annual Air		Average Annual	Average Annual
	Elevation (m/ft)	Temperature (°C/°F)	Precipitation (mm/in)	Snowfall Depth (m/ft)
Upper	2091/6860	1.0/34	950/37	7.0/23
Middle	1212/3976	6.4/44	689/27	2.7/9
Lower	978/3208	7.9/46	650/25	1.5/5

2.1.1.2. Hydrography

The Middle Fork Payette River watershed has predominantly a southerly aspect with side drainages facing generally east and west. The South Fork Payette River joins the Middle Fork Payette River one mile south of Crouch, Idaho to form the Main Payette River. This section between the Middle Fork Payette River and North Fork Payette is locally and commonly referred to the South Fork of the Payette. The Middle Fork Payette River drains 756 km² (292 mi²) (USDA 1976). The river is nearly 74 km (46 mi) long, excluding numerous tributaries within the sub-basin.

The valley cross sections within the Middle Fork Payette are usually deep, V-shaped in the mountainous upper elevation, shallow and rounded at mid-elevations, and become very wide within the lower valley near Crouch where deposition dominates the valley formation. The stream channel varies from Rosgen "B" type in the upper watershed to a "C" type in the lower watershed. The elevation of the stream is commonly bedrock controlled. The "B" channels are generally transport reaches and are dominated by particles of a bimodal distribution. Many particles are of boulder and large cobble sized, the second group is primarily sand sized or smaller sized particles. The "C" channels are generally deposition reaches and are dominated by sand sized or smaller sized particles.

The annual peak flow events often correspond with periods of maximum snowmelt and rain-on-snow events. Peak flows that result from spring snowmelt typically occur from April to June with the majority

of runoff coming from higher elevations in late May and early June. Rain-on-snow events typically occur from January through March.

Rain-on-snow related melt and high flows typically occur below elevations of 1981 m (6500 ft). High-intensity summer thunderstorms can result in surface runoff and localized flooding from disturbed areas in smaller drainages.

About 61% of the precipitation exits the Middle Fork Payette Sub-basin as streamflow (USGS, 1998; Western Regional Climate Center, 1998). Springs and seeps in the sub-basin vary in size, source, and location. Constant flowing springs and intermittent seeps occur in areas of well-fractured bedrock, mostly in areas of north-facing toe slopes. Seeps are common at mouths of secondary drainage ways where surface waters flow intermittently in spring. Hot springs are usually in the bottoms of major drainages and associated with fault zones.

Numerous water body naming systems have been used over the years. The Idaho Division of Environmental Quality (IDEQ) and the Idaho Department of Water Resources established Water Body Identification (WBID) numbers for waters in the state. This numbering system was used to identify specific waters. Slight modifications of the numbering system were made to ensure unique WBID numbers statewide. Table 2 provides some commonly used water body numbering systems.

Sixth field hydrologic units (sub-watersheds) identified within the Middle Fork Payette can contain several identified waters, and thus have more than one water body identification numbers associated within them. Names of the sixth field hydrologic units within the Middle Fork Payette are illustrated in Figure 2.

2.1.1.3. Geology, Soils, and Landforms

The Middle Fork Payette River basin is located within the southern Idaho Batholith and is dominated by forest vegetation. The terrain within the sub-basin varies from wide valley bottoms to steep hillsides with elevations ranging from 975 meters (3200 ft) to 2652 meters (8700 ft). The Middle Fork Payette River sub-basin is within the Northern Rocky Mountain physiographic province (USDA, 1976).

The Middle Fork Payette River sub-basin is near the western boundary of the Idaho Batholith (Figure 3). The Idaho Batholith is a granitic intrusive body that extends 483 km (300 mi) in a north-south direction and ranges from 129 km (80 mi) to 193 km (120 mi) wide. The batholith is composed of two lobes: the Bitterroot lobe to the north and the Atlanta lobe in the south, which includes the Middle Fork Payette River sub-basin. This area of Idaho is underlain by Cretaceous and Tertiary age intrusive rocks. Older plutons emplaced during the Cretaceous time were extensively faulted and then intruded by epizonal plutonic rocks and dike swarms. The Cretaceous batholith was exposed at the surface by Eocene time and lower extrusive units were later deposited on the surface. Rock composition of the batholith ranges from quartz gabbro to granite with the most common rocks consisting of granodiorite and quartz monzonite. The dominant rock type in the Middle Fork Payette River sub-basin is a two-mica granite (Muscovite-Biotite Granite).

Table 2. Middle Fork Payette River Water body Identification Numbers*

1. 1. 45

Idaho Water Quality Standards	Pacific Northwest Rivers System	Water Body Identification Number	Major Tributary
		ID-17050121-01	
		ID-17050121-03	
		ID-17050121-04	
SWB-322	703.00 ⁻	ID-17050121-06	Middle Fork Payette
3 W D-322	703.00	ID-17050121-10	River
		ID-17050121-12	
		ID-17050121-16	
		ID-17050121-18	
	704.00	ID-17050121-02	Anderson Creek
	708.00	ID-17050121-17	Bull Creek
		ID-17050121-05	Lightning Creek
		ID-17050121-07	Bio Dulidon Const.
,		ID-17050121-08	Big Bulldog Creek
		ID-17050121-09	Bulldog Creek
None Available		ID-17050121-11	Rattlesnake Creek
	None Available	ID-17050121-13	Silver Creek
• Act =	·	ID-17050121-15	Silver Creek
THE PROPERTY OF THE PROPERTY O	· .	ID-17050121-14	Peace Creek
	·	ID-17050121-19	Sanissas Caralla
	•	ID-17050121-20	Scriver Creek
		ID-17050121-21	Middle Fork Scriver Creek

^{*}Based on Fourth Field Hydrologic Unit Code.

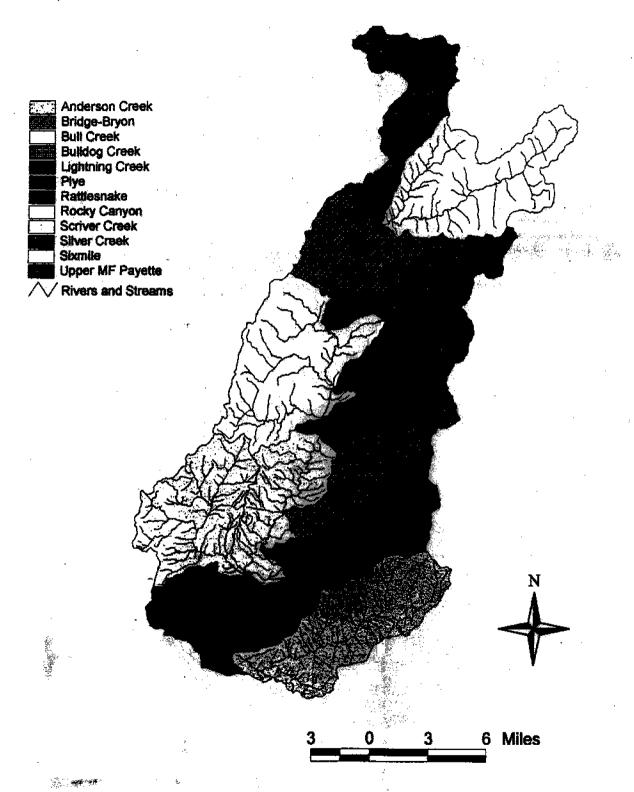


Figure 2: Sixth Field Hydrologic Unit Sub-Watersheds

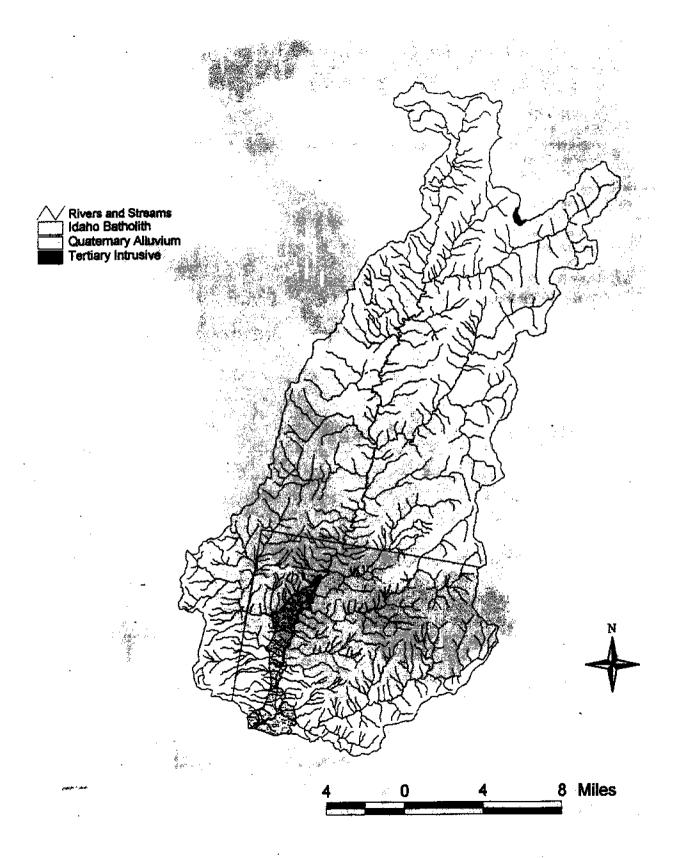


Figure 3: Geology of Middle Fork Payette River Basin

The steep, dissected mountainous lands of quartz monzonite and granodiorite have slopes ranging from 20 to 65 percent (Figure 4). The primary geomorphic processes that have shaped the landscape include faulting, fluvial actions, frost churning, and glaciation. Faulting appears to have been a major influence as the sub-basin follows a north-cast trending normal fault. This is presumably of Eccene age and represents a zone of crustal extension during emplacement of the batholith. Uplifted blocks provide topographic relief to the eroded ridges and depositional valley landforms. In the lower portions of the sub-basin, broad valley bottoms were created as alluvial material accumulated behind fault blocks that obstructed major streams. The canyons were formed after streams became deeply incised and breached the fault blocks. There is an up-warp at the northern boundary of the faulting, which resulted in the asymmetrical basins of the principle streams in this part of the batholith. It enabled headwater streams south of the up-warp to extend in a northern direction. The entrenchment of the Middle Fork Payette River near Railroad Pass gives some evidence that lands at the present sub-basin divide may have drained into the headwaters of the South Fork Salmon River.

Valley glaciation during the Pleistocene Era is indicative of the U-shaped valleys in Lightning Creek, Silver Creek, and Bull Creek drainages. The only remnant deposits, which may be attributed to glaciers, are in small areas at the head of Singeon-to-one Creek and the main stem of the Middle Fork Payette River.

2.1.1.4. Vegetation

The sub-basin is dominated by steep to moderately steep mountainous terrain covered by coniferous forests. About two percent of the sub-basin is relatively flat and is generally located in the lower elevations. These flats are mostly pasture lands.

Vegetation communities are strongly influenced by climate, landform, and geology. The lower elevation flat and benched areas along the lower Middle Fork Payette River are composed of pasture grasses, bunch grass, sage brush, and bitter brush with scattered clumps of ponderosa pine (USDA, 1976). Ponderosa pine is the principle tree species in the lower elevation areas mixing with Douglas-fir and grand fir at mid elevations and on north-facing slopes. Sub-alpine fir dominates the higher elevation areas, above 2133 meters (7000 ft), with Douglas-fir, lodgepole pine, and white bark pine present. Lodgepole pine is found in nearly pure stands scattered throughout the mid to higher elevation areas, particularly in flat cold air drainage pockets and where fire disturbance has occurred in the grand fir vegetation communities. Subalpine fir, spruce, and lodgepole pine are found along drainage ways.

2.1.1.5. Aquatic Fauna

Anadronious fishes historically occurred in the Middle Fork Payette River. These most likely included pacific lamprey (Entosphenus tridentorus), Snake River "spring" and "summer" chinook salmon (Oncorhynchus tshawytscha), and steelhead trout (Oncorhynchus mykiss) (Lee et al., 1996). The Black Canyon Dam effectively blocked migration of these fishes in 1924:

Resident fishes, as far as it is known, including suckers (Catostomidae), sculpins (Cottidae), mountain whitefish (Prosopium williamsoni), interior (Columbia River) redband trout (Oncorhynchus mykiss), bull trout (Salvelinus confluentus), hatchery stocks of rainbow trout (Oncorynchus mykiss), and brook trout (Salvelinus fontinalis), are found in the Middle Fork Payette River sub-basin (Boise National Forest, 1995; Lee et al., 1996). Simpson and Wallace (1982) reported bridgelip suckers (Catostomus columbianus) collected at the confluence of the Middle Fork and South Fork of the Payette rivers. They were also observed in Anderson Creek (Boise National Forest, 1995). Rainbow trout and brook trout

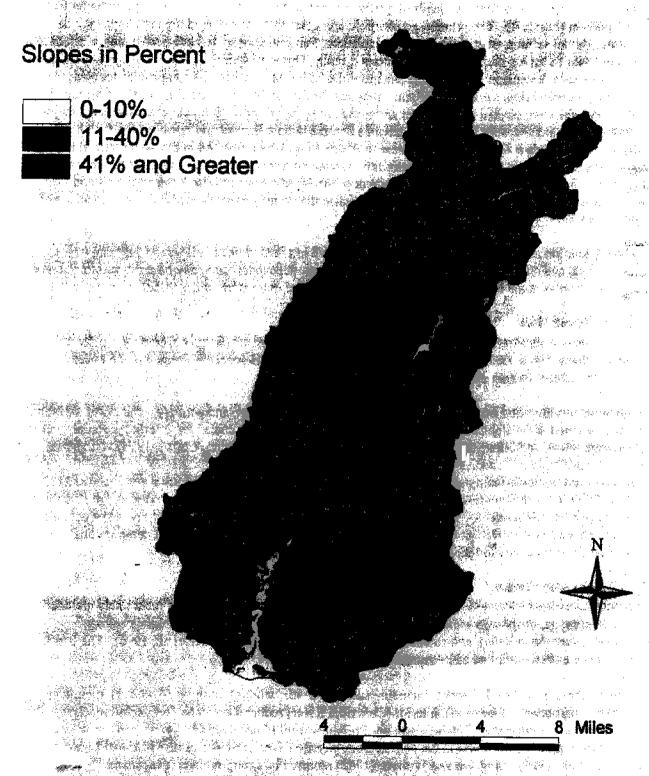


Figure 4: Slope Map of the Middle Fork Payette River Basin

have been introduced (Lee et al., 1996). Native interior redband trout and introduced rainbow trout are the most widespread and abundant resident species (Boise National Forest, 1995). Interior redband trout numbers are depressed throughout most of the Middle Fork Payette River sub-basin and predicted to be strong in Bull Creek waters (Lee et al., 1996). Bull trout have been observed in Bull Creek and throughout the Middle Fork Payette River, and haven't been detected in Bulldog Creek, Sixmile Creek, Silver Creek. Strength status has not been predicted. Buil trout spawning is unlikely to occur below 1500 meters (4920 ft) elevation or in watersheds smaller than 400 ha (990 acres) in size (Rieman et al., 1995). Bull trout spawning and rearing is unlikely in most of the watershed. Upper portions of Bull Creek and Upper Middle Fork Payette are the only segments currently being used for buil trout spawning and rearing. Other segments with potential but no utilization by buil trout include: upper Lightning Creek, Peace Creek, upper Silver Creek, lower Bull Creek, lower Upper Middle Fork Payette, and upper portions of Six Mile Creek.

Many of the Middle Fork Payette River sub-basin fish are of concern because of their reduced numbers. Those fish whose major recovery obstacles can be attributed to the loss of anadromy include the pacific lamprey, a state endangered species (Idaho Department of Fish and Game, 1994), and the Snake River "spring" and "summer" chinook salmon, and steelhead trout that are listed as threatened under the federal Endangered Species Act. On the other hand, there are fish whose recovery obstacles include pollutant reduction, such as this TMDL provides. Bull trout were listed as threatened by the US Fish and Wildlife Service spring of 1998. The State of Idaho has identified the Middle Fork Payette River watershed as a bull trout key watershed (State of Idaho, 1996). Interior redband trout are a federal candidate species and a state Species of Special Concern.

Data collected in the Middle Fork Payette River sub-basin relevant to fish mostly address summer distribution and abundance, and available habitat. Interior redband trout and rainbow trout are spring spawners (Simpson and Wallace, 1982). Bull trout, brook trout, and mountain whitefish are fall spawners. Bull trout likely exhibit fluvial and residential life history forms in the Middle Fork Payette. River sub-basin, spawning and rearing in tributary streams for a variable number of years before moving to larger streams and rivers to mature. They have more specific habitat requirements than other salmonids. Buil trout require clean substrate, stable channels, cold water temperatures, cover, and migratory corridors (Rieman and McIntyre, 1993). The relation to factors limiting bull trout and other

Most of the fishery information collected in this watershed are from the upland tributaries. Since the lower section of the Middle Fork of the Payette has relatively low numbers of fish, is not administered by Boise National Forest (who does most inventories in the area) it has not been intensively monitored.

on the Assistance and I have been a In 1978, Lyle Burmeister and Don Corley, fishery biologists for the Boise National Forest, evaluated the Middle Fork Payette River. Their primary conclusion was that the lack of quality pools was limiting cold water fish species (Burmeister, 1978). LOSSON STEEDING SEASON AND STREET

2.1.1.6. Sub-watershed and Stream Characteristics

2.4

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The valley cross sections within tributaries to the Middle Fork Payette are deep, V-shaped in the mountainous upper elevation, shallow and rounded at mid-elevations, and become very wide within the lower valley of the Middle Fork Payette near Crouch. The stream channel varies from Rosgen "B" type

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in the upper watershed to a "C" type in the lower watershed. The "B" channels are generally transport reaches and are dominated by particles of a bimodal distribution. Many particles are of boulder and large cobble sized, the second group is primarily sand sized or smaller sized particles. The "C" channels are generally deposition reaches and are dominated by sand sized or smaller sized particles.

Table 3: Summary of Sub-watershed Characteristics*

, :	, v. Že 1.	ti kudi.	g sa ja		anin/page	MEXIMUM		1.44.50	Measured	Predicted
Pare Subwatecheds	(square miles)	total streem length (solies)	drainage dentity	depositional reach density	elevation (foot)	eleration (feet)	Septim length:	relief netio	berkhil discharge (cfs	henkdoli
Upper MF Payette	24.4	46.2	1.86	0.562	4379	6800	11,50	0.042	,	110
Bull	37.9	67.9	1,79	0.334	4379	8080	12.8	0.055		189
Sixmile	14.6	276	1.89	0.502	3640	6000	6.2	0.065	37	56
West Fork	ta.9	16.7	1.53	0.620	3800	6128	6.8	0.065	Ì	38
Wet Foot	10.6	12.6	1.19	0.394	4000	6480	5	0.094	31.7	37
Silver	40.0	73.0	1.83	0,407	3740	7960	26 15A 👑	0.052	201.6	203
Raniemske	11.0	17.2	1.57	0.485	3520	6760	6	0.102	49.9	39
Buildeg	15,9	37.2	2.35	0,249	3120	7640	10.2	0.084	86.7	39 62
Lightning	25.8	58,5	2,27	0.344	3060	7920	*11.6	0.079	64.0	116
Scriver	29.8	82,3	2.76	0,463	3050	6400	84	1.076	102.9	139
Anderson	35.2	94.7	2.69	0.370	3026	7800	14.6	0.062	150.I	172
Composite Subwatescheds	(Silve vije) gajarita galar	total streets length (miles)	distings districtly	depositional reach	calciuman dovalna (Siat)	elevation (Sur)	temin length	entire entire	Manufad distanta (of)	Predicted backfull (factories (cfs)
Groundhog	14,6	34.7	2.37	0.570	4160	7748	A4	0.154	S CONTRACTOR	36 * 3. :
aike	6.7	13.5	2.02	0.320	4220	6889	3.6	0.140		21
Bridge	9.1	12.8	1.41	0.532	4020	6400	1 - 44 - 1	0.102	11/2/1962-197	(2. 5 36
Cocky Canyon	21.4	54.3	2.54	0.712	3050	5700	2	0.251		9 1
Pyle	30.5	93.4	3,06	1.846	3000	5800	∘ 6.2	0.086		144

^{*(}Fitzgerald et al., 1998a)

2.1.2. Cultural Characteristics

The Middle Fork Payette River basin is located in Valley and Boise counties. About 97% of the basin is managed for timber production by the USDA Boise National Forest, the State of Idaho Department of Lands, and the Boise Cascade Corporation (Figure 5). The remaining 3% is composed of the town of Crouch and small agriculture operations, and recreational homes.

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Within Valley County the land ownership is almost exclusively National Forest land. The land ownership within Boise County are Boise National Forest (primary), State of Idaho, Boise Cascade Corporation, rural subdivisions, small agriculture operations, ranches, and the city of Crouch. Both counties have very low population densities. The Valley County portion of the Middle Fork Payette sub-basin is located in the headwaters and has no domestic residences. For comparison though, Valley County has a density of 1.6 people per square mile and Boise County has 1.8 people per square mile. These low population densities reflect the large amount of federal and state land. Both counties have experienced a high percentage of population growth when compared to other counties in Idaho, nearly three times the state average (McGinnis, 1996). This equates to about a 250 people per year increase in Boise County and a 400 people per year increase in Valley County.

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A major road extends up the Middle Fork Payette River to Boiling Springs, a popular hot springs, with other roads extending up tributaries such as Anderson Creek, Scriver Creek, Lightning Creek, Sixmile Creek, West Fork Creek, and Silver Creek. A hot spring resort is located along Silver Creek and there are numerous undeveloped hot springs north of Boiling Springs. The city of Crouch is the main urbanized area within the sub-basin, however, there are also several rural subdivisions (summer and year-around residences) located along the lower river and its tributaries. The largest subdivision is Terrace Lakes located on benches along Warm Springs Creek.

Agriculture is conducted on a limited basis within the Middle Fork Payette basin. Pasture is present within the flatter side drainages around Crouch and hay is grown along the very flat portions closer to the Middle Fork Payette River. These activities are exclusively located within the Pyle sub-watershed near Crouch.

2.1.2.1. Land Use and Ownership

2.1.2.1.1 Forestry

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Recent disturbance activities associated with timber harvesting within the Middle Fork Payette Sub-basin include wildfire and road construction. There have been four wildfires larger than 809 ha (2000 acres) and numerous small fires, generally less than one acre, since the mid 1980s. Wildfire activity has been most evident in the Anderson Creek, Sixmile Creek (West Fork Creek), Lake Creek, Scriver Creek, and Pyle Creek sub-watersheds. Timber harvest activities, along with wildfire events, have produced a mosaic of successional stages. Road densities vary according to management activity throughout the sub-basin. Maximum road densities can exceed 1.7 miles per square mile (e.g., Scriver Creek and Sixmile Creek sub-watersheds). The condition of the majority of the roads in the sub-basin is unknown at this time.

Not all areas within the sub-basin have been disturbed by timber harvest and associated activities. Some areas have had little or no harvest activities (e.g., Bull Creek and Rattelsnake Greek). Currently, stand densities within undisturbed areas generally exceed conditions subject to more frequent wildfire events (Malany, 1998).

Many of the riparian areas show disturbance from timber harvest, road construction, grazing, and dispersed recreation camping. Many of the primary access roads were built within or adjacent to the Middle Fork Payette River and tributary riparian areas. Figure 6 shows the current road density within the subwatershed.

Roads that were originally built for forest products extraction have become the road system for many housing subdivisions within the areas adjacent to Crouch. Outside of the Crouch area these same roads are now used for snowmobiles, hunting, and other recreational uses. Because these roads were originally designed for seasonal use only they do not contain rolling dips, outsloped drainage control, or other sediment control measures normally present on roads intended for year-round use.

2.1.2.1.2. Agriculture/Grazing

Cartle, sheep, horse, and domestic elk grazing occur within the Pyle sub-watershed and within the lower portions of Lightning and Easley Creek. Cattle grazing is concentrated in the lower elevations and sheep grazing generally at the mid to high elevations. Pasture lands are primarily irrigated by gravity flow. Major water diversions for irrigation occur on Anderson Creek, Lightning Creek, Easley Creek, and the

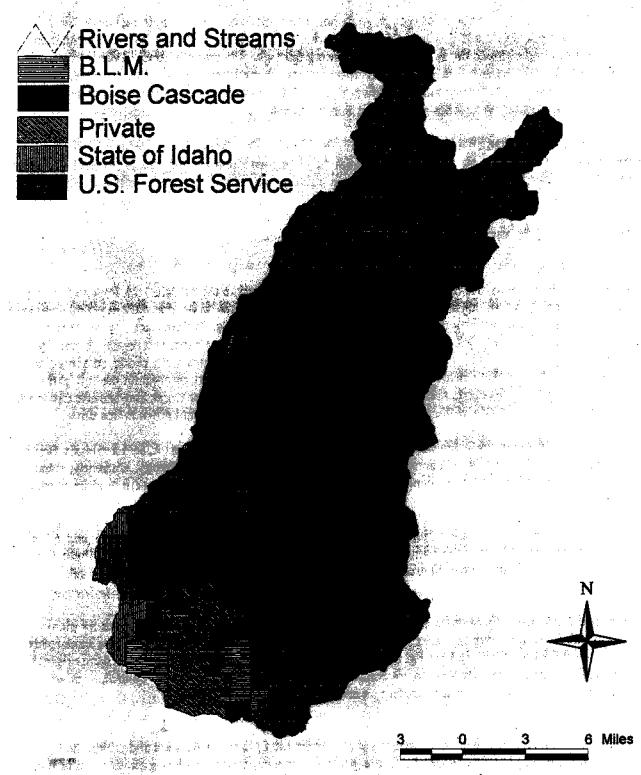


Figure 5: Land Ownership Within the Middle Fork Payette River Basin

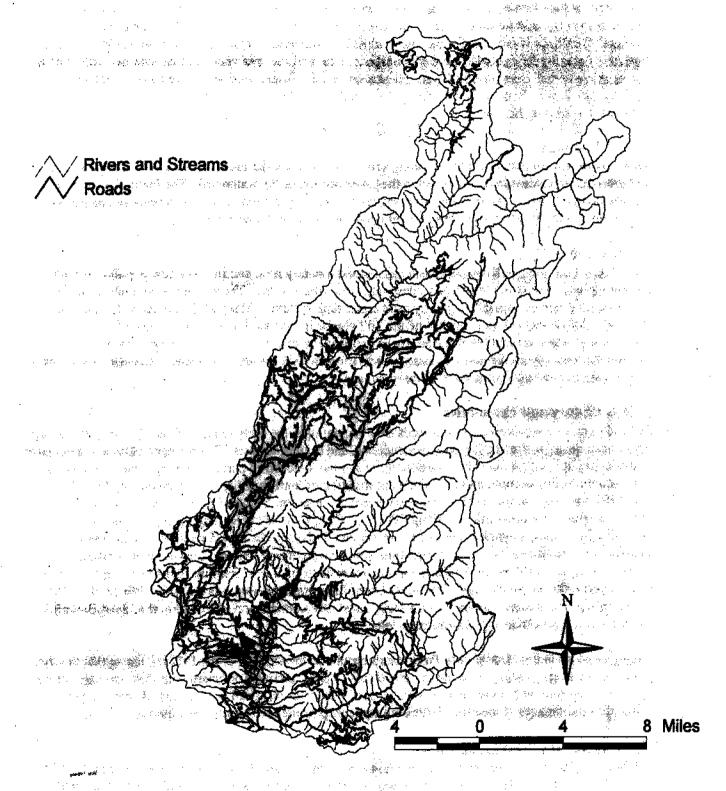


Figure 6: Road Density Within the Middle Fork Payette River Basin

main stem of the Middle Fork Payette River. Other areas are irrigated by sprinklers or depend on precipitation (dry land farming). Hay is the typical crop within this area with two cuttings per year on the average. No tillage is required for this crop unless a modification of the hay variety or quality is desired. Past cattle grazing far exceeded current conditions. Much of the area once used for intense cattle grazing has been converted to pasture for horse. Horses are usually fenced well above the banks of the Middle Fork Payette River. Bank trampling along the Middle Fork Payette River is evident in those areas where cattle have access to the river.

2.1.2.1.3. Mining

There are no known precious metals mining activities in the Middle Fork Payette River sub-basin. Past and present aggregate mining is limited to the lower section of the watershed. The Idaho Division of Environmental Quality has restricted all point source discharges from existing and proposed aggregate operations in the basin to eliminate sediment contributions from these operations.

2.1.2.1.4. Urban

The Middle Fork Payette River sub-basin has a predominately rural setting. The few population centers present include the city of Crouch and numerous rural subdivisions. The businesses and homes in Crouch and other areas are on separate or jointly used septic tank systems. Many of the homes in Crouch and in the rural subdivisions maintain lawns and the golf course in Terrace Lakes also has vast areas of manicured landscaping. Also, as mentioned earlier, roads that were originally built for forest products extraction have become the road system for many housing subdivisions within the areas adjacent to Crouch. These roads may or may not be re-constructed for year round use.

2.1.2.2. History and Economics

Early settlers used wood products from this area beginning in the early to mid 1800s. The majority of uses would have been for firewood, home constructions, and mining timbers. Timber harvesting and associated road construction within the valley portion of the sub-basin occurred during the early 1900s. A second entry into the valley portion, along with the construction of lumber mills, took place during the 1950s. Up until 1950, the main Middle Fork Payette road went as far as the mouth of Silver Creek, with connecting roads over Trail Creek Summit and along Silver and Bridge Creeks to Boiling Springs. From the 1950s on, timber harvesting and associated road construction in the Middle Fork Payette River sub-basin expanded into tributaries such as Scriver, Anderson, and Lightning Creeks. This activity continued to increase through the 1960s and 1970s as the sub-watersheds of Silver, Sixmile, West Fork, and Wet Foot were managed for timber harvest. The Silver Creek Experimental Area was set up in 1961 by the USDA Forest Service to research various impacts from forest management activities within the Idaho Batholith (Payette River Local Working Committee, 1990).

Grazing pressure in the Middle Fork Payette sub-basin was heavy prior to the 1970s. During these early periods heavy sheep grazing occurred in upland area. Cattle grazing associated with the local agriculture population occurred within the lower valley portion of the sub-basin and within Little Anderson and Scriver Creek drainages. Since the 1970s both types of grazing have steadily declined.

2.2. Regulatory Requirements

In 1994 EPA placed five tributaries and the mainstem of the Middle Fork Payette River on Idaho's §303(d) list as water quality limited due to excess sediment. These segments were carried forward to the 1996 list. The listed segments included: Anderson Creek, Lightning Creek, Scriver Creek, Bulldog Creek, Silver

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Creek, and the mainstem of the Middel Fork Payette River. All of these segments were located within the Boise National Forest and were determined to be water quality limited based on exceedences of the Boise National Forest Plan standards and guidelines (USDA, 1990) and best professional judgement. Guidance for listing water bodies as water quality limited provided by Region 10 of the EPA states that any determination of water quality limited status based on this type of exceedences and professional judgement can be re-examined (EPA, 1995).

The listed water quality limited segments within the Middle Fork Payette sub-basin were re-analyzed according to current Idaho water quality standards and the IDEQ Water Body Assessment Guidance (IDHW, 1996a) as specified under IDAPA 16.01.02.053 during the preparation of this TMDL. The IDEQ Water Body Assessment Guidance requires the use of the most complete data available to make beneficial use support status determinations.

Results of the Water Body Assessment for the Middle Fork Payette River indicate that the lower reaches (i.e., below Big Bulldog Creek) are not fully supporting cold water biota due to a high sediment load and subsequent changes to channel morphology. The narrative Idaho water quality standard for sediment states that "sediment shall not exceed quantities,...which impair designated beneficial uses" (IDAPA 16.01.02.200.08). These lower reaches, therefore, are currently considered to be water quality limited based on the Idaho narrative water quality standard for sediment.

Additional Water Body Assessments conducted for tributaries to, and the upper segments of, the Middle Fork Payette River found that designated and existing beneficial uses are currently at full support (Appendix A). These segments, originally on the 1994 §303(d) list, have been dropped from the State of Idaho's 1998 §303(d) list. The 1998 §303(d) list has not been submitted at the time of this report. However, the pollutant load allocations within this TMDL reflect the current IDEQ support status based on the Water Body Assessments for the mainstern and the tributaries to the Middle Fork Payette River.

2.2.1. Federal Requirements

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The Federal Clean Water Act (CWA) requires restoration and maintenance of the chemical, physical, and biological integrity of the nation's waters (Public Law 92-500 Federal Water Pollution Control Act Amendments of 1972). Each state is required to adopt water quality standards necessary to protect fish, shellfish, and wildlife while providing for recreation in and on the water whenever attainable.

Section 303(d) of the Clean Water Act establishes requirements for states to identify and prioritize water bodies that do not meet state water quality standards despite the application of technology based controls on point sources. States must publish a list [a.k.a. §303(d) list] of these waters, including priority ranking of such waters, every two years. States must develop Total Maximum Daily Loads (TMDLs) set at a level to achieve water quality standards including seasonal variations and a margin of safety for waters identified on the §303(d) list. A TMDL documents the current load, the load capacity (i.e., the amount of a pollutant a water body can assimilate without violating a state's water quality standards), and allocates the load capacity to known point and nonpoint sources.

TMDLs are defined in 40 CFR Part 130 as the sum of the individual Waste Load Allocations (WLA) for point sources, and Load Allocations (LA) for nonpoint sources, including a margin of safety and natural background conditions. Regulations implementing §303(d) are found at 40 CFR Part 130. Total maximum daily loads are defined under §130.2 as:

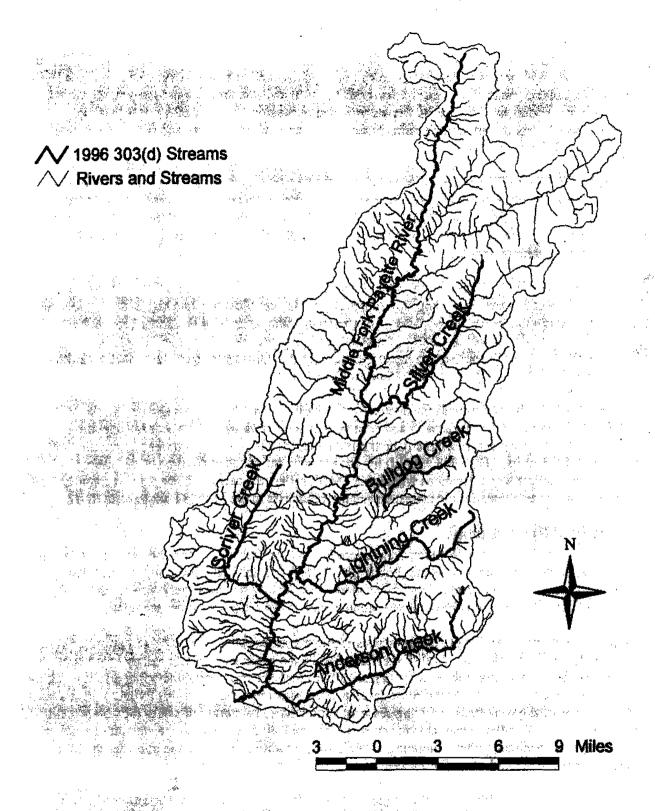


Figure 7. Water Quality Limited Segments Within the Middle Fork Payette River Basin'

Based on the 1994 §303(d) List

The sum of the individual WLAs for point sources and LAs for nonpoint sources and natural background. If a receiving water has only one point source discharger, the TMDL is the sum of that point source WLA plus the LAs for any nonpoint sources of pollution and natural background sources, tributaries, or adjacent segments. TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure...

In essence, TMDLs and TMDL implementation Plans are water quality management plans which allocate responsibility for pollution reduction with a goal of achieving water quality standards within a specified period of time.

2.2.2. State Requirements

In response to a federal lawsuit in 1993, Idaho adopted Idaho Code sections 39-3601 through 39-3616, which establish state water quality law. In summary, these laws require:

- monitoring of all streams to establish designated uses and determine whether water bodies comply with state water quality standards;
- develop TMDLs for waters which do not comply with water quality standards; and
- establish citizen advisory groups [Basin Advisory Groups (BAGs) and Watershed Advisory
 Groups (WAGs)], to advise IDEQ on prioritizing impaired water bodies, how to properly manage
 impaired watersheds, and recommend pollution control activities in impaired watersheds.

Subsequent to adoption of Idaho Code §39-3601, et. seq., IDEQ adopted implementing regulations. Public participation requirements for BAGs and IDEQ are outlined in IDAPA 16.01.02.052. Idaho Administrative Procedures Act 16.01.02.053 establishes a procedure to determine whether a water body fully supports designated and existing beneficial uses, relying heavily upon aquatic habitat and biological parameters, as outlined in the Water Body Assessment Guidance (IDHW 1996a). Idaho Administrative Procedures Act 16.01.02.054 outlines procedures for identifying water quality-limited (WQL) waters that require TMDL development, publishing lists of WQL water bodies, prioritizing water bodies for TMDL development, and establishes management restrictions, which apply to WQL water bodies until TMDLs are developed.

2.2.3. Current Idaho TMDL Development Schedule

Pursuant to federal district court order, in 1996, the U.S. Environmental Protection Agency (EPA) issued a §303(d) list for Idaho, which identified 962 water bodies requiring TMDLs. The EPA and the IDEQ also submitted a schedule to the court for developing all required TMDLs on the 1996 §303(d) list within eight years. In the schedule, WQL water bodies are grouped by sub-basin, such that all TMDLs within the sub-basin will be developed at the same time. The TMDL development process is divided in three parts; 1) development of a sub-basin assessment; 2) development of water quality targets, loading estimates, assimilative capacity, and allocations; and 3) development of an implementation plan. Steps 1 and 2 are considered to be the TMDL required for EPA submittal and approval under the eight year development schedule. Step 3, the implementation plan, is to be developed within 18 months of EPA approval of Steps 1 and 2.

2.2.4. Applicable Water Quality Standards

Idaho has developed water quality standards to protect its waters. Idaho's water quality standards include;

surface water classifications for the designated beneficial use designations for surface waters (Section 2.2.4.1) and water quality criteria (Section 2.2.4.2).

2.2.4.1. Designated Beneficial Uses Beneficial uses for many water bodies are listed in Idaho's Water Quality Standards and Wastewater Treatment Requirements (IDHW 1996b). The Middle Fork Payette River, source to mouth, have the following designated beneficial uses: domestic water supply, agriculture water supply, cold water biota, salmonid spawning, primary and secondary contact recreation, and as a special resource water (IDAPA 16.01.02.140.01.ee). Designated beneficial uses for this and other water bodies in the Middle Fork Payette River basin are listed in Table 4. The remaining water bodies in the Middle Fork Payette River sub-basin do not have specific beneficial use designations in IDAPA 16.01.02. These water bodies are given the designations of existing uses, cold water biota, secondary contact recreation, and primary contact recreation when enough flow is present (i.e., 5 cfs or greater) (IDAPA 16.01.01.101.01). Existing beneficial uses are those uses that existed on or after November 28, 1975, the effective date of the Clean Water Act.

2.2.4.2. Surface Water Classifications
Surface water classifications are also referred to as beneficial uses. These classifications are intended to protect surface water. They are comprised of five categories; water supply, aquatic life, recreation, wildlife habitat, and aesthetics.

Water supply waters are those which are suitable or intended to be made suitable for:

- agricultural crop irrigation and water for livestock;
- domestic drinking water, and
- industrial water for industrial purposes.

Aquatic life waters are those which are suitable or intended to be made suitable for the protection and maintenance of viable communities of aquatic organisms and populations of significant aquatic species as follows:

- cold water biota optimal growing temperatures below 18°C (64°F);
- warm water biota optimal growing temperatures above 18°C (64°F); and
- salmonid spawning which provide or could provide habitat for active, self-propagating populations of salmonid fish.

Recreation waters are those which are suitable or intended to be made suitable for:

- primary contact recreation prolonged and intimate contact by humans or for recreational activities where the ingestion of small quantities of water is likely to occur, and
- secondary contact recreation recreational uses on or about the water and which are not included in the primary contact category.

Wildlife Habitats waters are those which are suitable or intended to be made suitable for wildlife habitats. Aesthetics are applied to all waters.

Table 4. Designated Beneficial Uses in the Middle Fork Payette River Basin

THE REPORT OF THE PARTY OF THE

	Aquai	ic Life	Ŵŧ	uter Su	pply	Recre	ation	Wildlife		
Major Tributary	Cold Water	Salmonid		st.	14/2	, the	· · · · · · · · · · · · · · · · · · ·	Habitats	Aesthetics	
e je jelgojaš	Biota	Spawning	Ag.	Dom.	Ind.	l. °	2°		, 1979 1981 - 1982	
Middle Fork Payette River	D	* D	D	D	D*	Δ.	D	D *	D *,	
	a (D •	THE SE	E		D*	D*		D *	D*	
Anderson Creek			***	- 440 1. 1. 2. √8	ال	DN St.		D *		
Lightning Creek	**************************************	······································	E	, (149).	D*	D*		D* (≰)	S& D* . €	
Big Buildog Creek (lower)	D*	E			D*	D*		D *	D*	
Big Bulldog Creek (upper)	D*			**************************************	D*	D *		D•	b *	
Buildog Creek	D			. Asi60	D*	D*	rija ya	D*	D*	
Rattiesnake Creek	D*				D*	D•		D*	D*	
Silver Creek (lower)	D*	E	***		D*	D*		D *	D*	
Peace Creek	D*	, E	juseri	Da Soute	D*			D *	D*	
Silver Creek	D *	E			D*	D*		Çş. : D* - \$*.	D*	
Bull Creek	D*	E			D*			D*	D*	TW ST
Scriver Creek (lower)	D*	E		57. vin *	D *	D*		D*	D *	e tigán e ser til Mitágo e til seguele
Scriver Creek (upper)	D*	E			D*	D*	* (X	D *	D*	
Middle Fork Scriver Creek	D*	E			D*			D *	D*	

[&]quot;designated" in §140 of Idaho Water Quality Standards and Wastewater Treatment Requirements "default designation", Identified as result of Beneficial Use Reconnaissance Project monitoring or observation through §100 or §101 of Idaho Water Quality Standards and Wastewater Treatment Requirements

2.2.4.3. Water Quality Criteria

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Idaho water quality standards includes water quality criteria necessary to protect the beneficial uses. It is IDEO's position that habitat characteristics which might adversely affect beneficial uses are not pollutants under §303(d) of the Clean Water Act. Therefore, none of the State of Idaho water quality criteria specify habitat requirements for beneficial use support.

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existing use identified as result of Beneficial Use Reconnaissance Project monitoring data or observation. A CONTRACTOR e e ke**ngay**as e is

Idaho water quality standards are broken into three sections; General Surface Water Criteria, Surface Water Quality Criteria for Use Classifications, and Site-Specific Surface Water Quality Criteria. For reference please refer to the Idaho Water Quality Standards and Wastewater Treatment Requirements (IDHW, 1996b).

2.2.4.3.1. General Surface Water Criteria

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The general surface water criteria are usually referred to as the narrative criteria. These criteria are applied to all waters of the state in addition to other criteria that may apply. Generally, these criteria state that waters shall be free from materials or matter in concentrations that impair beneficial uses. Sediment is among these materials. Middle Fork Fayette River water bodies are listed in §303(d) for impairment as a result of sediment. The general surface water criteria for sediment (IDAPA 16.01.02.200.08) from Idaho Water Quality Standards and Wastewater Treatment Requirements (IDHW, 1996b) is as follows:

Sediment shall not exceed quantities specified in Section 250, or, in the absence of specific sediment criteria, quantities which impair designated beneficial uses. Determinations of impairment shall be based on water quality monitoring and surveillance and the information utilized as described in Subsection 350.02.b.

Section 250 specifies a numerical turbidity standard for cold water biota. This standard includes a maximum of 50 NTU above background at any time or a maximum of 25 NTU above background for 10 consecutive days. Subsection 350.02.b generally describes the Best Management Practices feedback loop for non-point source activities.

2.2.4.3.2. Surface Water Quality Criteria for Designated Use Classifications

These criteria are usually referred to as the "numeric criteria" and include specific concentrations for individual pollutants that are based on categories and individual beneficial uses.

Recreation

Primary contact recreation criteria apply during the summer months, and secondary contact recreation applies year round. The major constituent is fecal coliform bacteria. Those water bodies for which primary contact recreation is designated, existing, or not precluded from should have fecal coliform bacteria counts of less than 500/mL (17/oz) at any time or less than 200/mL (7/oz) averaged over a 30 day period. All other water bodies (secondary contact recreation) should have fecal coliform bacteria counts of less than 800/mL(27/oz) at any time or less than 400/mL (13.5/oz) over a 30 day period. Fecal coliform bacteria concentrations represent concentrations of materials that have passed through warm blooded animals intestines, and are also surrogates for other pathogens. There are also toxic substances criteria set forth in 40 CFR 131:36(b)(1) Column D2.

Aquatic Life

All streams with aquatic life use classifications (cold water biota, warm water biota, salmonid spawning) should have concentrations of:

- pH between 6.5 and 9.5;
- dissolved gas not exceeding 110%;
- total chlorine residual of less than 19 μg/L/hr or and average of 11 μg/L/4 day period;
- less than toxic substances criteria set forth in 40 CFR 131.36(b)(1) Columns B1, B2, D2.

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Cold water biota are the life forms that inhabit cold water. These life forms include: game and non-game fish; aquatic macroinvertebrates; and aquatic periphyton. All streams with cold water biota use classifications should have concentrations of:

- dissolved oxygen concentrations exceeding 6.0 mg/L;
- temperatures less than 22°C (72°F)(instantaneous), and 19°C (66°F)(daily average);
- · low ammonia (formula/tables for exact concentration);
- turbidity less than 50 nephelometric turbidity units (instantaneous) or 25 nephelometric turbidity units (10 day average) greater than background.

Salmonids are all those fish that are classified in the family Salmonidae. The family Salmonidae contains the whitefish, salmons, trouts, chars and graylings. Salmonids are characterized by the presence of an adipose fin and a pelvic appendage. Spawning criteria apply during time periods listed in Idaho Water Quality Standards and Wastewater Treatment Requirements, unless site specific spawning periods are available. The time periods are based on the spawning and egg incubation period by each species of salmonid. The most likely native salmonids to be spawning in in the Middle Fork Payette River sub-basin are redband and rainbow trout (January 15 - July 15), and bull trout (September 1 - April 1), and mountain whitefish (October 15 - March 15). Salmonid spawning numeric criteria would apply to Middle Fork Payette River sub-basin from September 1 to July 15, as a result of the cumulative needs of salmonids. All streams with salmonid spawning use classifications should have concentrations of:

- intergravel dissolved oxygen exceeding 5.0 mg/L (instantaneous) or 6.0 mg/L (7 d average);
- dissolved oxygen concentrations exceeding 6.0 mg/L (same as cold water biota);
- water temperatures less than 13°C (55°F) (instantaneous), 9°C (48°F) (daily average); or
 - · low ammonia (same as cold water biota).

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Water Supply and Other Uses

Water supply use classifications include domestic drinking water, wildlife habitats, and aesthetics. The last two beneficial uses should generally be supported when more sensitive beneficial uses criteria (e.g., cold water biota) and general water quality criteria are applied.

The State of Idaho Department of Health and Welfare is the primary agency responsible for the protection of public drinking water in the State of Idaho. Idaho Rules for Public Drinking Water Systems include criteria necessary to protect all domestic water supplies. Requirements have been set forth for Treatment Techniques (IDAPA 10.01.08.500), Design Standards (IDAPA 10.01.08.550), and Operating Criteria for Public Drinking Water Systems (IDAPA 10.01.08.552).

Drinking water systems are classified according to whether a system is a public system and the number of people usually served. According to the IDEQ (Rae, 1998) there are two public water supply systems within the Middle Fork Payette Sub-basin. One is located just up from the confluence with the South Fork Payette River and serves the Rivers Point Subdivision. The other is located within the Scriver Creek sub-watershed, on Warms Springs Creek. No non-community (transient or non-transient) water systems within the sub-basin have been identified. All surface sources of drinking water must maintain filtration and disinfection systems intended to maintain safe drinking water (IDAPA 16.01.08.550.05).

2.3. Water Quality Concerns and Status

The Idaho Water Quality Standards designate the beneficial uses for the Middle Fork Payette River as

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salmonid spawning, cold water biota, secondary recreation, primary contact recreation, domestic water supply, agricultural water supply, and as a special resource water (IDAPA 16.01.02.140.01.ee). Tributaries to the Middle Fork Payette River without specific beneficial use designation in IDAPA 16.01.02 are given designations of existing uses, cold water biota, secondary contact recreation, and primary contact recreation when enough flow is present (i.e., 5 cfs or greater) (IDAPA 16.01.02.101.01). IDEQ Beneficial Use Reconnaissance Project (BURP) surveys have been conducted on numerous water bodies within the Middle Fork Payette River basin since 1995. These BURP data and other data were analyzed following the guidance provided in the IDEQ Water Body Assessment Guidance (IDHW 1996a). Available data for water body assessments within the Middle Fork Payette River basin are listed in Table 5. Current support status as determined by the IDEQ are listed in Table 6.

2.3.1. Sediment Source Inventory

The purpose of this pollutant source inventory is to assess the current sources of sediment in the Middle. Fork Payette River. This assessment uses the IDEQ (1997) TMDL guidelines and is based on existing information on natural (i.e., background) and management related sediment sources within the Middle Fork Payette River basin. Currently, there are five land use categories in the watershed that must be considered as having the potential to increase sedimentation of the Middle Fork Payette River: 1) timber management; 2) dry land and irrigated agriculture; 3) grazing; 4) recreation; and 5) urban development.

2.3.1.1. General Background

Natural and management induced sediments sources in the Middle Fork Payette River have been studied by numerous individuals and agencies. The climatic, hydrologic, geologic, soils, vegetation and landform characteristics of this watershed are the cause of naturally high erosion rates (Reinig et al., 1991; Clayton, 1986; Megahan and Ketcheson, 1996; USDA, 1976). Historic and present land use have increased erosion rates and sediment yield, and caused excess sedimentation of the mainstem Middle Fork Payette River.

Sediment loads can be characterized by their frequency of delivery, particle size compositions, and amounts. For example, surface erosion from new road construction can deliver fine sediments to a stream on a frequent basis over a two to three year period. The high frequency of this delivery can combine with a large amount of available material when many roads are constructed at once, thus producing a large sediment load. Once a road has aged a few years, the frequency and amount of fine sediment delivery diminishes. Debris flows and other forms of mass wasting, on the other hand, can deliver a large amount of fine and coarse sediments to a stream during a single event. The remaining debris flow paths which remain after the event can produce surface erosion for a few years, much like a newly constructed road. Additional characteristics of debris flow deliveries are that they often occur during high stream flow events and occur less frequently than surface erosion sediment delivery events.

Once sediment has reached an active stream channel there are a variety of hydrologic processes that store or transport sediment down-stream. Sediment storage and transport are a function of sediment characteristics (e.g., input grain size distribution and fall velocity), channel energy dissipation (i.e., roughness), reach slope, and flow level. When the sediment input is increased within a stream system an overall decrease in the mean particle size or a widening and shallowing of the channel geometry occurs due to the change in the sediment transport capacity of a reach.

Field observations by IDEQ personnel have noted active streambank erosion in few isolated places within Reach 5 of the Middle Fork Payette River. The locations and amount of streambank erosion suggest that this erosion is a result of a high sediment load from the contributing area to Reach 5 and

Table 5. Available Data for the Middle Fork Payette River Hydrologic Unit

Source S		Purpose of the Study with Moniforning Constituents	(Y/N)
Beneficial Use Recommissance Project	1993-ргозепт	To assess support status of designated and existing beneficial uses—chemical, physical, and biological measures.	Y
Burton, Timothy	1992	Evaluating the effectiveness of forcetry best management practices using rapid bloassessment procedure. Silver Creek, BNF.	N ₂ ,
Boise National Forest Aquatic Survey Data Base	1993-1995	Compilation of fisheries and habitat data.	Y
Stream temperature: Silver Creek	1995	Characterize summer temperature regime for fish habitat-part of Silver Creek Landscape Assessment.	N ₂
Stream channel cross-sections: West Fork Creek	1987	Forest Plan Trend Monitoring	N _L
Existing condition descriptions	1987-1994	Bear Wallow, Silver Creek Salvage, West Fork environmental assessments	N ₂
Watershed-Fisheries Evaluation	1994	West Fork Environmental Assessment/Biological Evaluation	N ₄
BOISED sediment model	1996	Sediment yield modeling of hervest activities, burning, and roads: Clear Creek Summit Environmental Assessment.	N ₄
Temperature monitoring	1993, 1995	Assess support status of beneficial uses via temperature; Stoney Meadows, Ligget Creck, Middle Fork Payette River at 409 bridge.	N ₂
R1-R4 Habitat Inventory	1993	Assess habitat for beneficial uses and presence/absence: Upper Middle Fork Payette River, Stoney Meadows Creek ((Wolman Pebble Count, anorkeling).	N ₂
WFE Inventory	1994	Review of RCHA's and mitigation measures: Clear Creek Summit Environmental Assessment.	N ₄
Biological Evaluation	1994	Evaluation of ball front Clear Creek Summit Environmental Assessment	N,
Corley's fish and stream data	1994	Fish habitat data (Sull trout presence/absence) and cobble embeddedness.	N ₂
Burmeisfer, L. And D. Corley	1978	Stream inventory of the Middle Pork Payette River.	a N

Data older than five (5) years.

Data not used in subbasin assessment, however, may be used in Total Maximum Daily Load.

Data not readily available.

Data does not apply to water quality-limited water body.

subsequent channel morphology change. The rate of crosion is a function of channel morphology change only. Therefore, it is thought that the percentage of the current sediment load due to bank crosion is not significant when compared to the sediment load from the contributing area to Reach 5.

Table 6. Support Status of Water Bodies withing Middle Fork Payette River Watershed

Water Body Identification	Description .	Domestic Water Supply	Agri. Water Supply	Cold Water Biota	Salmonid Spawning	Primary Contact Rec.	Secondar y Contact Rec.
ID-17050121-01	MF Payette - Anderson to mouth	Full Support	Fall Support	Not Full Support	Full Support	Full Support	Pull Support
ID-17050121-02	Anderson Creek		Pull **	Fall	Full	Pull	,
			Support	Support	Support	Support	Ç.X
ID-17050121-03	MF Payette - Scriver to Anticrson	Fuil Support	Pull Support	Not Full Support	Full Support	Poil Support	Full Support
ID-17050121-04	MF Payette - Lightning to	Full Support	Fall Support	Not Full Support	Full Support	Pull Support	Full
	Scriver		orbinit.	Support	oupper:	авррин	Support
ID-17050121-05	Lightning Creek		Pall Support	Foll Support	Full Support	Full Support	
ID-17050121-06	MF Payette - Big Bulldog	Full Support	Pell Support	Not Puil Support	Pell Support	Pail Support	Full Support
	to Lightning						J. P. L.
ID-17050121-07	Big Bulldog - Bulldog to mouth			Fuil Support	Pull Support	Pull Support	
ID-17050121-08	Big Bulldog - headwaters			Full		Rul	
	to Bulldog			Support		Support	
ID-17050121-09	Bulldog Creek			Full		Full	
ID 15050131 16		Fall	Poli .	Support Pull	Puli	Support	
ID-17050121-10	MF Payette - Rattlesnake to Big Bulklog	Support	Support	Support	Support	Support	Puil Support
ID-17050121-11	Rattlesnake Creek			Pull .	Net	Full	
		T-10		Support	Assessed	Support	
ID-17050121-12	MF Payette - Silver to Rattlesnake	Pull Support	Pull Support	Full Support	Full Support	Full Support	Puli Support
ID-17050121-13	. 18 7 7 3	**		Fu <u>li</u> Support	Full Support	Full Support	
ID-17050121-14	Peace Creek			Fuli	Full	Poli	
### ##				Support	Support	Support	
ID-17050121-15	Silver - headwaters to Peace		·. • ·	Full Support	Full Support	Full Support	

Water Body Identification	Description	Domestic Water Supply	Agri. Water Supply	Cold Water Biota	Salmonid Spawning	Primary Contact Roc	Secondar y Contact Rec.
ID-17050121-16	MF Payette - Bull to Silver	Full Support	Full Support	Full Support	Pull Support	Full Support	Full Support
ID-17050121-17	Bull Creek			Full Support	Full Support	Full Support	÷
ID-17050121-18	MF Payette - headwaters to Bull	Full Support	Full Support	Full Support	Full Support	Full Support	Full Support
ID-17050121-19 ID-17050121-20	Scriver - MF Scriver to mouth			Full Support Full	Full Support Full	Full Support Full	81 1928 1831
ID-17050121-21	Scriver - headwaters to MF Scriver MF Scriver Creek	·		Support Pull Support	Support Full Support	Support Full- Support	

2.3.1.2. Background Sediment Production

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Natural hillslope erosion processes include hillslope creep, mass failure, and surface erosion. Acceleration of erosion rates prior to anthropogenic land use change likely occurred as a result of fire and episodic precipitation, snowmelt, and flood events. In the Middle Fork Payette River, natural sources of sediment that results from bank erosion and channel degradation appear to be low relative to hillslope erosion rates.

Land managers within the Middle Fork Payette subbasin have evaluated background and management related erosion rates through the use of models. Two of these include BoiSed (Reinig et al., 1991) and SedMod (Boise Cascade, 1998). Background erosion rates in BoiSed are based on erosion rates measured during a long term study within the Silver Creek drainage of the Middle Fork Payette basin. These background rates include sediment inputs from hillslope creep, landslides, and other erosion mechanisms present under natural forested conditions (Table 7).

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Table 7: BoiSed Background Hillslope Sediment Production with Sediment Transport Coefficient

	1	TANDAR BARAN	Same of the same o	Discharge			7/3 / 45 (5)
	Background		1 W 1	Adjusted	Y 7150	Potential	Amount
100	Sediment *	Potential	e di el	Potential		Sediment	Delivered
	(toones/yr,	Stream	Discharge	Stream	Deposition	Transport	(tonnes/yr,
Pure Watersheds	tons/yr)	Power	Coefficient	Power**	Ratio	Coefficient***	tons/yr)
Upper MF Payette	1205; 1328	0.078	0.092	0,007	0.562	0.013	16, 17
Buil Creek	977; 1077	0.098	0.158	0.015	0,334	0.046	45; 5 0
Bridge-Bryon	1230; 1356	0.236	0.033	0.008	0.477	0.016	20, 22
Sixmile	1852; 2041	0.112	0.040	0.005	0.553	0.008	15; 16
Silver Creek	985; 1086	0.095	0.169	0.016	0.407	0.039	38; 42
Rattlesnake	255; 281	0,160	0.032	0.005	0.485	0.011	28; 3.1
Rocky Canyon	529; 583	0.637	0.076	0.048	0.712	0.068	36; 40
Buildeg Creek	491; 541	0.197	0.052	0.010	0.249	0.041	20; 22
Lightning Creek	621; 685	0.180	0.096	0.017	0.344	0.050	*** 31; 34
Pyle	383; 422	0.262	0.120	0.031	1.046	0.030	12, 13
Scriver Creek	831; 916	0.209	0.116	0.024	0.463	0.052	43; 48
Anderson Crock	1046; 1153	0.167	0.143	0.024	0.370	0.065	68; 75

Based on BoiSed Background Sediment Rate Estimates

2.3.1.3. Management Related Sediment Production

2.3.1.3.1. Hillslope Erosion

In the Middle Fork Payette River hill slope erosion above background typically results from forest roads and timber harvest activities. Land use related causes of increased erosion rates include: 1) timber harvest activities; 2) grazing; 2) dry land and irrigated agriculture; 3) urban and suburban development; and 4) recreation. Additional processes that increase instream sediment include: 1) hydrologic alteration; 2) cattle grazing; 3) stream-side irrigation; and 4) instream construction. It is difficult to estimate the impacts of past intense grazing to the riparian area or channel morphology. The lower Middle Fork Payette River channel is slightly entrenched and the water seldom accesses the flood plain. The cumulative effects of forest practice's changes in hydrography, accelerated sediment rates, and grazing's bank de-stabilization have modified the nature of the channel.

2.3.1.3.2. Fire

Forest fires, natural and human caused, also increase erosion rates. Both surface erosion and mass wasting are increased after high intensity wild fires. Many of the existing sediment sources in the watershed result from fire. For example, high mass wasting frequencies are attributed to high intensity forest fires ignited during 1986. Fire occurrence over the past 50 years is shown in Figure 8 (USDA, 1997).

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^{**} Stream Power x Discharge Coefficient (Fitzgerald et al., 1998a)

^{***} Adjusted Stream Power/Deposition Ratio (Fitzgerald et al., 1998a)

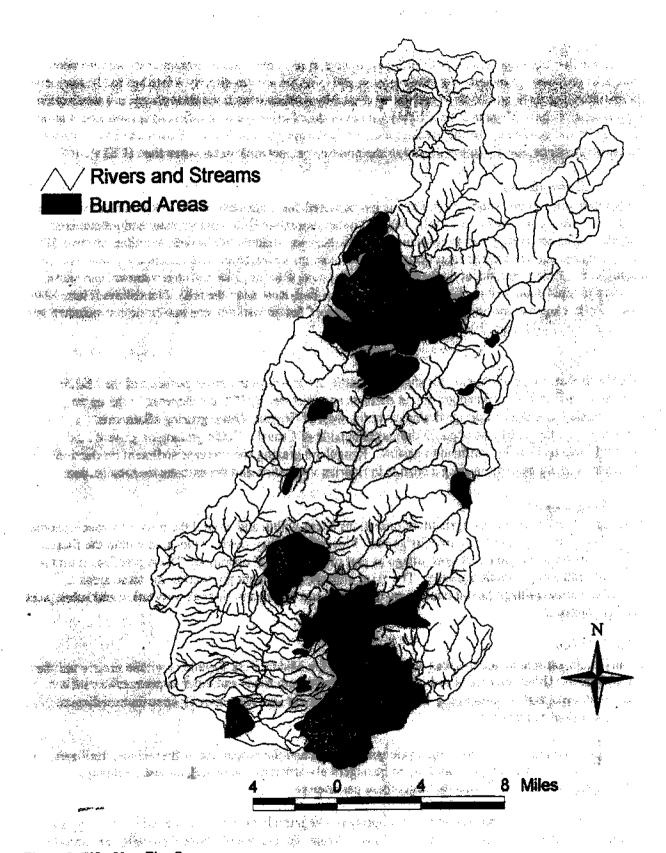


Figure 8: Fifty Year Fire Occurrence

2.3.1.3.3. Roads

Surface erosion from road cut slopes, fillslopes, tread surface, cross-drains, stream crossings are known sources of sediment. Accelerated surface erosion and mass failure are directly related to road construction and maintenance. In addition, slope instability caused by road construction and drainage problems often triggers mass failure (Megahan et al., 1978). In the Middle Fork Payette, the first roads were built in the early 1900s and continue to be the greatest source of anthropogenic sediment. Roads can have a variety of effects on the landscape, Figure 6 illustrates the present road network in the watershed (USDA, 1997).

2.3.1.3.4. Timber Harvest

Timber extraction in the Middle Fork Payette has occurred since the early 1900s. High intensity jammer logging occurred in the 1950s and early 1960s. Timber extraction from federal, state and private lands currently exists and is expected to continue. Disturbances associated with harvest activities are two fold. First, increased surface erosion rates occur during project implementation and continue for about six years (Reinig et al., 1991). Second, at the harvest unit scale, complete (i.e., clearcut) tree removal can cause increases in rapid snowmelt during rain-on-snow events thus increasing the risk of landslides (Harr, 1986; Luce, 1997). However, complete tree removal within the Middle Fork Payette sub-basin is conducted very infrequently if at all (Glass, 1998).

2.3.1.3.5. Range

Federal and State range allotments for sheep and cattle occur within the lower portions of the Middle Fork Payette River basin. Sheep grazing allotments administered by IDL are centered in the upper Scriver, Easley, and Warm Springs drainages to the west of Crouch. Other grazing allotments administered by the BLM also occur in drainages outside of Crouch. Cattle grazing on private land within this area tends to be confined to pasture. Rangeland grazing can increase sediment production within a stream drainage by causing a change in riparian vegetation and streambank destabalization.

2.3.1.3.6. Agriculture

Small scale, private alfalfa hay agriculture operations occur within and around the town of Crouch. Some of these agriculture operations involve irrigation. Most of these hay fields are located within the flattest portion of the basin and do not require tillage as part of their normal operation. These practices limit the amount of sediment production greatly. The main impacts to sediment production for these areas is confined to periodic tillage (about once every ten years) and changes to riparian vegetation and subsequent bank destablization.

2.3.1.3.7. Urban

The only sediment source due to urban activities within the Middle Fork Payette is within and around the town of Crouch. Urban sources of sediment include runoff from roads and other impermeable surfaces, unvegetated areas, and construction activities. These sediment sources generally contribute sediment during stormwater runoff events.

The effluent from properly functioning septic tank systems and the proper use of herbicides, fertilizers, and pesticides used in landscaping are unlikely to be negatively affecting the beneficial uses, although monitoring has not been performed to target these parameters.

Bank protection in order to protect adjacent property has negatively affected the beneficial use support of the Middle Fork Payette River. One of the actions a stream like the Middle Fork Payette River naturally performs, is meandering. As a stream meanders, fine sediment is deposited on point bars, and erosion

occurs on the outside of meander bends. These meandering streams have much more of the complex habitat conditions the native fish are suited for, and more than is currently observed in the lower Middle Fork Payette River. A common practice for protecting ones property from eroding away is to armor (riprap, car bodies) the outside of the meander.

While there are many individuals in the community that have worked hard to prevent excess sediment from entering the Middle Fork Payette, a significant portion still do not see sediment input into the stream a problem. In the past and today, for individuals who haven't adopted stream improvement goals, the Middle Fork Payette River is and has been over utilized. Banks have been and still are damaged by recreational vehicles. Riparian vegetation has been and is still being removed for the view. Direct pollution also occurs. Individuals have been observed dumping wheel barrows of soil and other waste directly in the stream.

Both Valley and Boise Counties have experienced high population growth rates over the past few years (McGinnis, 1996). Around the Garden Valley area, which includes the town of Crouch, building permits within the Middle Fork Payette River Basin increased from 19 in 1990, to 104 in 1994, and dropping slightly to 54 and 78 in 1996 and 1997. Of the permits issued in 1997 approximately 18% were for new homes. Currently, no erosion control control or drainage control ordinances are in operation within this area (Boise County Planning Department, 1998).

2.3.1.4. Current Sediment Load Estimate

Estimates for hillslope sediment levels due to management activities and the increase over background due to management related activities can be made using a variety of models. Two of these include the draft SedMod (Boise Cascade, 1998) and BoiSed (Reining, et al., 1991). Neither of these two examine the effects of management activities on landslides, or incorporate increases to sediment loads due to fire, range, agriculture, or urban activities. Also, the estimates provided by these models are based on current sediment sources during average climatic conditions and, therefore, do not provide estimates of the current load being routed by the stream. The current sediment load estimates for both SedMod and BoiSed are presented in Tables 8 and 9.

Table 8: SedMod Percent Above Background*

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	Management 💮 🗀	Background Percent San Name 1
Sub-Watershed	(tonnes/yr; tons/yr)	(tonnes/yr;tons/yr) Above Background (%)
Upper Payette	170.3; 187.7	240.9; 265.5
Bull	1.4; 1.5	357.3; 393.9
Bridge-Bryon	213.9; 235.8	398.0; 438.7
Silver	151.5; 167.0	387.3; 426.9
Sixmile	562.0; 619.5	385.4 ; 424.8 146
Rattlesnake	66.7; 73.5	98.6; 108.7
Rocky Canyon	342.8; 377.9	436.6; 481.3
Bulldog	0.0; 0.0	214.5; 236.4
Lightning	29.1; 32.1	334.9; 369.2
Scriver	446.2; 491.9	451.6; 497.8
Pyle	579.8; 639.1	550.6; 606.9
Anderson	303.7; 334.8	533.2; 587.8
	- · · · · · · · · · · · · · · · · · · ·	

^{*}Based on road surface erosion (management) and hillslope creep (background) only. Landslide inputs are not considered in this estimate.

Table 9: SedMod Percent Above Background Results by Reach

		V	A PARTY OF STREET			
	a gada yan ay katalan	Management	Background	Percent Above (Sumulative Perc	ent see
Reac	h	(tonnes/yr)	(tonnes/yr)	Background (%)	Above Backgro	und (%)
RI.			797.2	35	35	
R2	and the state of t	107	199	54	70	
R3 -		713.7	772.7	92	62	
R4		238.1	316.9	75	64	
R5		200.5	767.7	26	54	
R6		1026	1002.2	102	67	
<u>R7</u>		303.7	533.2	57	65	•

Table 10: BoiSed Percent Above Background*

		STATE OF THE STATE
	Management	Background BoiScd Percent
Sub-Watershed	(tomes/yr, tons/yr)	(tonnes/yr; tons/yr) Above Background (%)
Upper Payette	159.9; 176.3	823.8; 908.1
Bull		778.7
Bridge-Bryon	229.0; 252.4	1038.3; 1144.5
Silver	120.9; 133.3	1110.0; 1223.6
Sixmile	1044.7; 1151.6	1809.3; 1994.4
Rattlesnake	35.7; 39.3	344.7, 380.0
Rocky Canyon	117.5; 129.5	831.9; 917.0
Bulldog	3.6; 3.9	
Lightning	94.4; 104.1	801.0; 882.9
Scriver	373.9; 412.1	864.1; 952.5 43.3
Pyle	164.8; 181.7	435.6; 480.2
Anderson	523.6; 577.2	1283.9; 1415.3 A0.8

^{*}Current sediment loads from USDA Porest Service managed lands only, Gravel and dirt roads grouped together.

Table 11: BoiSed Percent Above Background Results by Reach

Reach (tons/	이 그렇게 끊고 있는데 그렇게 즐거워 하지만 하는 어떻게 얼굴하면 없다고요?	ve Camulative Percent (%) Above Background (%)
RI 3082 R2 126.2	2258.5 572.3 22	15
R3 1284.9 R4 104.1	3218 0 40 838 3 12	
R5 172.8	1911.7	
R6 599.8 R7 777.2		and the second s

In addition to these modeled results, a geomorphic risk assessment for sediment has also been conducted within the Middle Fork Payette (Fitzgerald et al., 1998a). This assessment identified those subwatersheds most likely to contain the largest amount of deliverable sediment. Sub-watersheds with high natural (i.e., background) sediment yields are Lightning, Big Bull Dog and Groundhog. Pure subwatersheds that are likely to deliver the largest anthropogenic sediment loads to the Middle Fork Payette River include: Anderson; Scriver; Lightning; Sixmile; West Fork, and Wet Foot. Composite subwatersheds that have substantial anthropogenic sediment yields are: Pyle; Rocky Canyon; Bridge; and Groundhog. The geomorphic risk assessment also identifies those watersheds with a high risk for internal sediment problems due to anthropogenic sources. These watersheds include: Anderson; Scriver; Lightning; Sixmile; West Fork; Wet Foot; and Silver.

A cooperative sediment trend monitoring study with the EPA, IDEQ, and the USDA Forest Service is currently being conducted within the Middle Fork Payette sub-basin. The results of this effort are

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helpful in quantifying streamflow and captured bedload particle sizes within the Middle Fork Payette sub-basin. The draft report covering the 1998 data collection season presents bedload:discharge rating curves for two sites in the lower reaches of the Middle Fork Payette River based on 11 bedload samples. Estimates of the sediment load during the spring runoff period (late April through June) at these two sites indicate a load of 57.5 tons/m² at the confluence with Lightning Creek and 88.5 tons/m² at the site near the mouth. Note that theses data show an estimated increase in bedload sediment production as the length of flow within the alluvial portion of the sub-basin increases, a condition highly unlikely in an agrading river system.

Even though these numbers appear to be highly suspect, the bedload sediment production rates can be combined for a gross estimate of current sediment production for the Middle Fork Payette River subbasin to estimate that about 73 tons/m² was generated from the Middle Fork Payette River sub-basin. This would indicate that, for the spring of 1998 runoff period, about 25,000 tons of bedload sediment were routed to the mouth of the Middle Fork Payette River (Fitzgerald et al., 1998b).

2.3.2. Beneficial Use Support Status

IDAPA 16.01.02.053 codifies IDEQ's procedure to determine whether a water body fully supports designated and existing beneficial uses, relying heavily upon aquatic habitat and biological parameters, as outlined in the Water Body Assessment Guidance (WBAG) (IDHW 1996a). The WBAG requires the use of the most complete data available to make beneficial use support status determinations. Data collected within the Middle Fork Payette River sub-basin used in this analysis includes reconnaissance by IDEQ, Boise National Forest aquatic surveys, Boise National Forest baseline habitat evaluations, and Idaho Department of Fish and Game surveys. These data were evaluated to supplement Beneficial Use Reconnaissance Project (BURP) data and were collected according to IDEQ approved quality assurance and quality control guidelines, have been analyzed, collated, and are presented in Table 11.

In 1994 the EPA placed five tributaries and the mainstem of the Middle Fork Payette River on Idaho's §303(d) list as water quality limited due to excess sediment. These segments were carried forward to the 1996 list. The listed segments included: Anderson Creek, Lightning Creek, Scriver Creek, Bulldog Creek, Silver Creek, and the mainstem of the Middle Fork Payette River. All of the listed segments were located within the Boise National Forest and were determined to be water quality limited based on exceedences of the Boise National Forest Plan standards and guidelines (USDA, 1990) and best professional judgement. Guidance for listing water bodies as water quality limited provided by Region 10 of the EPA states that any determination of water quality limited status based on this type of exceedences and professional judgement can be re-examined (EPA, 1995).

The listed water quality limited segments within the Middle Fork Payette sub-basin were re-analyzed according to current Idaho water quality standards and the IDEQ Water Body Assessment Guidance (IDHW, 1996a) as specified under IDAPA 16.01.02.053 during the preparation of this TMDL.

Results indicate that the lower reaches (i.e., below Big Buildog Creek) are not fully supporting cold water biota due to a high sediment load and subsequent changes to channel morphology. The narrative Idaho water quality standard for sediment states that "sediment shall not exceed quantities...which impair designated beneficial uses" (IDAPA 16.01.02.200.08). These lower reaches, therefore, are currently considered to be water quality limited based on the Idaho narrative water quality standard for sediment. Stream segments on the 1996 §303(d) list within the remainder of the watershed were found to fully

support all designated and existing beneficial uses (Appendix A). The 1998 §303(d) list has not been submitted at the time of this report.

Table 6 shows the catagories of support for each waterbody within the Middle Fork Payette River
Watershed. Assessments were only performed for designated or existing uses. Industrial water supply,
wildlife habitat, and aesthetics beneficial use were in the "full support" catagory for all water bodies and
do not show up on the table. Warm water biota beneficial use neither existed nor was designated and
therefore is also not shown on the table. Details of these water body assessments are in Appendix A.

Bull trout have been identified as the most sensitive beneficial use species within the Middle Fork
Payette. This means that the bull trout are the most intolerant to pollution and habitat degredation.
Overwintering and migration of adult and sub-adult bull trout have been determined to be limited by the
instream habitat conditions, specifically the lack of large pools, within the lower reaches of the Middle
Fork Payette due to excess sediment and related morphology change. It is assumed by the IDEQ that
objectives established for the success of this species will also benefit other fish within the Middle Fork
Payette River.

Support status analysis by IDEQ indicates that the lower reaches of the Middle Fork Payette River are not providing full support to cold water biota beneficial uses. The impairment is generally a lack of habitat complexity and, more specifically, a homogeneous system lacking fish cover. The habitat simplicity found in the lower reaches is the result of excessive sediment accumulation. Essentially, this habitat simplicity means that there is no camoflange, cover, and other requirements for fish survival. It is thought that the lower reaches of the Middle Fork Payette River has few places for fish to survive, and therefore, contains few fish. The few redband/rainbow trout observed in the impaired section appear to be using schooling suckers as cover. While juvenile recruitment appears to be sufficient, there are few adult and sub-adult salmonids.

The most significant factor in providing adequate/suitable living space is quality pools. Pools provide fish hiding areas through physical depth, collection of woody debris, surface/bubble film, and secured substrate. Bear Valley Creek, to the north of Middle Fork of the Payette is similar in gradient and sediment load. Pools, two meters in depth, have been used to evaluate sediment reduction in Bear Valley. Currently there are only two two-meter pools on the last 10 km (impaired section) of Middle Fork Payette.

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As mentioned, changes to stream morphology within the lower reaches of the Middle Fork Payette stem from excessive sedimentation. An increase in large pool formations within these lower reaches would improve the identified beneficial use support within these reaches. Large pool formation should be favored by a decrease in sediment load. However, recovery based upon load reduction could take a long time and might be accelerated by construction of instream structure. Consideration of such treatment of symptoms is not the purpose of a TMDL, but may be considered in implemention, as a compliment to load reductions.

2.4. Pollution Control Efforts

2.4.1 Forestry

Throughout the Middle Fork Payette River sub-basin awareness has increased as a result of the Boise National Forest Plan (USDA, 1990). Additionally, the Rules and Regulations pertaining to the Idaho

Forest Practices Act (IDAPA 20.02.01) have caused both State and private timber managers to take actions which reduce sediment production due to timber management. Present timber harvests, road building and maintenance, and livestock grazing management have all shown an overall improvement in relation to water quality within the watershed.

Since the late 1970's, all federal, state, and private forest land managers have followed a strict set of harvesting guidelines specifically written to minimize or prevent erosion and sedimentation of streams.

The requirements of these guidelines are intended to meet or exceed the Idaho Forest Practices Act.

These guidelines have been updated several times as new technologies have been developed.

Specific activities within the Middle Fork Payette River sub-basin include: reconstruction of many older roads to meet current standards, improved drainage structures, water bars, grass seeding, and relocating out of riparian areas; natural dirt roads have been surfaced with gravel and payement to eliminate road surface erosion; temporary road closure activities with gates and/or berms; and permanent road closure activities. Ongoing efforts include ongoing inspection and routine maintenance for areas managed by all of the land managers within the Middle Fork Payette River sub-basin.

2.4.2 Agriculture and Grazing

Agricultural Best Management Practices (BMP's) have been implemented in Boise and Valley Counties with great success. The no-till conservation farming of alfalfa reduces the sediment production off of these lands greatly. Water and sediment control structures and grassed waterways reduce overland flow and subsequent gully erosion on cropland. Fencing, livestock access ramps, pasture and hay land management, and proper grazing use are other BMP's used to improve livestock grazing and management:

Sediment reduction incentive programs available to landowners within the Middle Fork Payette River sub-basin have included cost-share incentives. Prior to the 1990's these programs were administered through the Farm Service Agency's (formerly the ASCS) Alternative Conservation Program (ACP). Under this program site specific BMP's were implemented to reduce livestock impacts to streams and other water bodies. These BMP's consisted of fencing, ponds, off-site watering systems, spring developments, and no-till farming practices.

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3. TMDL Target, Analysis, and Allocation

3.0. Introduction

In 1994 the EPA placed five tributaries and the mainstem of the Middle Fork Payette River on Idaho's 303(d) list as water quality limited due to excess sediment. These segments were carried forward to the 1996 list. The listed segments included: Anderson Creek, Lightning Creek, Scriver Creek, Bulldog Creek, Silver Creek, and the mainstem of the Middle Fork Payette River. All of the listed segments were located within the Boise National Forest and were determined to be water quality limited based on exceedences of the Boise National Forest Plan standards and guidelines (USDA, 1990) and best professional judgement. Guidance for listing water bodies as water quality limited provided by Region 10 of the EPA states that any determination of water quality limited status based on this type of exceedence and professional judgement can be re-examined (EPA, 1995).

The listed water quality limited segments within the Middle Fork Payette sub-basin were re-analyzed according to current Idaho water quality standards and the IDEQ Water Body Assessment Guidance (IDHW, 1996a) as specified under IDAPA 16.01.02.053 during the preparation of this TMDL.

Results of the Water Body Assessment for the Middle Fork Payette River indicate that the lower reaches (i.e., below Big Bulldog Creek) are not fully supporting cold water biota due to a high sediment load and subsequent changes to channel morphology. The narrative Idaho water quality standard for sediment states that "sediment shall not exceed quantities, which impair designated beneficial uses" (IDAPA 16.01.02.200.08.). These lower reaches, therefore, are currently considered to be water quality limited based on the Idaho narrative water quality standard for sediment. Stream segments on the 1996 §303(d) list within the remainder of the watershed were found to fully support all designated and existing beneficial uses (Appendix A).

Section 303(d) of the Federal Clean Water Act requires States to develop a Total Maximum Daily Load (TMDL) management plan for water bodies determined to be water quality limited. A TMDL documents the amount of a pollutant a water body can assimilate without violating a state's water quality standards and allocates that load capacity to known point and nonpoint sources. TMDLs are defined in 40 CFR Part 130 as the sum of the individual Waste Load Allocations (WLA) for point sources and Load Allocations (LA) for nonpoint sources, including a margin of safety and natural background conditions. There are no National Pollution Discharge Elimination System (NPDES) pollutant sources present within the Middle Fork basin at this time. Therefore, the entire allocation specified within this TMDL is a LA for nonpoint sources only.

Over the past 80 years an excessive sediment load within the Middle Fork Payette River has resulted in channel and habitat alteration. Mechanical changes to the system (e.g., channel straightening, removal of organic debris, and/or dredging) has been minimal. In other words, the sediment pollutant load over time has been the primary cause of channel morphology alterations. These alterations, in combination with an ongoing high sediment load, are the main factors impairing beneficial use support within the lower reaches. Changes to the current channel morphology should be favored by a decrease in sediment production within the watershed, however, this may take a long time and recovery could be accelerated by construction of instream structure along with load reductions.

The goal of the narrative sediment standard is to manage past and present sediment loads so that the designated and existing beneficial uses receive full support. However, "habitat modification or alteration" is not specified as a pollutant under the Clean Water Act or Idaho water quality standards. Therefore, a waterbody impaired by habitat alteration alone (e.g. does not result in or is not a product of a pollutant) is not considered water quality limited and a TMDL is not required.

In the case of the Middle Fork Payette River TMDL, even though channel morphology and habitat alterations have resulted from the sediment pollutant load, targets are established to address sediment load limitations only (i.e., targets do not include any requirements for in-stream channel modifications). Attainment of these sediment targets or attainment of beneficial use support will indicate that the narrative sediment water quality standard is achieved.

3.1. Data Gaps

3.1.1. Fisheries

Most of the fishery information collected in this watershed are from the upland tributaries. Since the lower section of the Middle Fork of the Payette has relatively low numbers of fish, is not administered by Boise National Forest (who does most of the inventories in this area), and is dominated by non-game fish, it has not been intensively monitored. An inventory of juvenile species composition within the lower reach stream margins is also lacking at this time.

Obtaining this additional information on fish presence and usage would allow an improved diagnosis for the specific needs of designated and existing species within the lower reaches. This information is also needed to determine both the current baseline for cold water biota support and to provide a measure of beneficial use recovery. Because of these diagnostic and ongoing needs to determine cold water biota support status, it is evident that a fish inventory for both game and non-game fish in the lower Middle Fork Payette river is a data gap.

3.1.2. Mass Wasting

Mass wasting events have been a large component of the historical sediment load entering the Middle Fork Payette River (Gray and Megahan, 1981; Megahan et al, 1978). The large rain-on-snow events in 1965, the early 1970s, and in 1997 contributed to numerous slides within sections of the Middle Fork Payette sub-basin. During the development of this TMDL it became apparent that the lack of adequate prediction/planning tools for mass wasting for background and managed forest systems is a serious data gap at this time.

A twenty year sediment production study was conducted by the USDA Forest Service within the Silver Creek Experimental Area, located within the Silver Creek sub-watershed of the Middle Fork Payette River sub-basin. This study provides relatively good estimates of background rates of sediment input from both hillslope creep and landslides (Clayton and Megahan, 1985). The Silver Creek study also showed how forest management within this sub-watershed did not increase peak flows or frequency, but did increase sediment input to Silver Creek from surface erosion (Megahan et al, 1995). The planning model used by the Boise National Forest, BoiSed, uses results of this study in order to predict the effects of past and future management activities on sediment production within the Middle Fork Payette sub-basin. Management activities modeled include road construction, timber harvest, and fire (Potyondy et al, 1990).

A supplemental component of BoiSed looks at the increase in mass wasting due to management activities (Reinig et al, 1991). This mass erosion is designed to predict shallow debris and avalanche-debris flows stemming from new road construction. Within the model's framework, as the age of the road increases, the mass erosion acceleration factor generally decreases. This approach has inherent limitations for evaluating the effects of episodic rain-on-snow events on management induced landslides. As has been seen during recent harvest planning efforts within the Lightning Creek sub-watershed, as the age of the road increases, the mass wasting potential does not necessarily decrease.

Another planning tool, called SedMod, has been developed by Boise Cascade to predict management increases to sediment production in forested basins. This model relies on the Washington State Cumulative Effects Watershed Assessment Protocol for determining hillslope creep for background sediment production and surface erosion from roads for management induced sediment production. This model is currently under development and results from the initial runs presented in this TMDL may change. Also, while attempts are currently under way to evaluate background and management induced mass wasting, this aspect of sediment production is still not represented within SedMod (Glass, 1998).

The current Middle Fork Payette TMDL sediment load and required reductions reflect this data gap. The targets presented within this TMDL for hillslope sediment production are in terms of "percent above background". These target "percent above background" values are based on changes in sediment accumulation within the Middle Fork Payette as estimated background sediment input levels are increased. This, in combinations with modeled background and current load estimates, establishes a quantitative target load for the average annual sediment input for all types of erosion processes (Table 13). Current load estimates and estimated load reductions needed in order to meet these targets, however, do not include increases to mass wasting due to management activities. Because a current load estimate and required load reductions are considered to be critical elements for TMDL approval, those values available at this time are presented here. On going reconnaissance and model development to be completed during the implementation phase of this TMDL will provide improved values for current sediment loads and required reductions (see Section 4).

3.1.3. Sediment Transport Capacity

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This TMDL establishes a target for sediment input in terms of "percent above background" based on a 50% increase in reach deposition rates over background deposition rates. These results are based on average annual background sediment input rates entering the Middle Fork Payette River. Current cross-section geometries at selected points have been used to represent average reach conditions. These simplifications combine with the annual variability for flow and sediment input to make it unlikely that the exact deposition rates estimated here would be present within the Middle Fork Payette River. New data, information, or model refinements to this approach will most likely lead to improvements in future applications.

It is generally recognized that sediment input increases which result in observable changes in stream characteristics are detrimental to fisheries, however, it is extremely difficult to identify the point where these increases begin to affect reach deposition, transport capacity, and changes to particle size distributions (Chapman and McLeod, 1987; Potyondy et al, 1991). Prior to this TMDL, a threshold of 100% above background was selected as "excessive sediment" by the USDA Boise National Forest. This threshold was determined by an observation by Potyondy et al. (1991) that impacted conditions within the Middle Fork Payette River were a result of levels above background of as much as 200%. It was observed

that these levels were too high based on the observed channel conditions. It was recommended to reduce these historical levels by 50%, or, in other words, set a threshold for sediment production to 100% above background sediment levels (Potyondy et al., 1991).

This TMDL is faced with a similar quandary as the Forest Service was when establishing a sediment production threshold. While it is apparent that the current levels of hillslope sediment production are "excessive" based on the support status of the lower reaches, the degree of excess sedimentation is difficult to quantify at this time. By selecting an increase in reach deposition of 50% over background as the load capacity it is recognized that improvements to the lower reaches will occur (i.e., the amount of sediment currently entering the impaired reaches would need be reduced by half). However, whether these improvements are great enough to meet beneficial use support, either on their own or through additional measures, is unknown at this time. Ongoing IDEQ beneficial use support status analysis, in combination within on going reconnaissance efforts and implementation plan development as described in Section 4, will identify whether the initial reductions established here are adequate for beneficial use support.

3.2. Sediment TMDL Analysis

3.2.1. Identified Pollutant Impacts

The Middle Fork Payette River typically receives sediments from landslides; forest roads, and exposed soil areas due to construction and agriculture activities. Gravel sized sediments (5 mm) originating in the upper watershed and tributaries are routed down steep channels and accumulate in the flatter reaches in the lower portion of the basin. Sediment monitoring over the past year has indicated that the sediment loads entering the Middle Fork Payette do not produce high turbidities or suspended sediments, but do contribute a large amount of material to the bedload (Fitzgerald et al., 1998b). The primary nonpoint sources (NPS) of pollutants in the Middle Fork Payette River basin are forest management activities, grazing, small scale agriculture operations, county road construction and management, urban runoff, and land development activities.

The narrative Idaho water quality standard for sediment states that "sediment shall not exceed quantities...which impair designated beneficial uses" (IDAPA 16.01.02.200.08.). The sediment targets established by this document is an interpretation of this narrative water quality standard. Section 2 of this TMDL examines how the identified beneficial uses are impacted due to excess sediment. Based on this analysis targets are established for an allowable amount of sediment above background for each of the impaired reaches within the Middle Fork Payette sub-basin.

Sediment loads can be characterized by their frequency of delivery, particle size compositions, and amounts. For example, surface erosion from new road construction can deliver fine sediments to a stream on a frequent basis over a two to three year period. The high frequency of this delivery can combine with a large amount of available material when many new roads are constructed at once, thus producing a large sediment load. Once a road has aged a few years, the frequency and amount of fine sediment delivery diminishes dramatically. Debris flows and other forms of mass wasting, on the other hand, can deliver a large amount of fine and coarse sediments to a stream during a single event. The remaining debris flow paths which remain after the event can produce surface erosion for a few years, much like a newly constructed road. Additional characteristics of debris flow deliveries are that they often occur during high stream flow events and occur less frequently than new road construction surface erosion sediment delivery

events.

In order to define an excessive sediment load, the receiving body's assimilative capacity needs to be evaluated. Assimilative capacities of a receiving body can change according to flow, sediment particle size, and channel geometry. Frequent delivery of fine sediments from excessive surface erosion is thought to impact the channel bed surface composition, shifting the composition from a more coarse to a more fine particle size distribution. Frequent delivery of coarse and fine sediments from frequent mass wasting, on the other hand, is thought to impact the channel geometry by shallowing and widening it. Additionly, the frequency of sediment delivery can influence a stream's assimilative capacity. Rare and infrequent mass wasting events, for example, tend to cause few changes to the channel geometry. If the frequency of these events increase, the channel may accommodate these ongoing sediment loads by widening and shallowing. This follows the observations that as the sediment load increases over a long period, the channel configuration changes in order to accommodate (i.e., transport) this sediment load.

3.2.2. Sediment Loading Analysis

A total maximum daily load (TMDL) is the maximum amount of pollutant that can enter a waterbody so that the State's water quality standards will be met. These thresholds can also be considered the "load capacity" that meets, or works towards, beneficial use support. TMDLs are defined in 40 CFR Part 130 as the sum of the individual Waste Load Allocations (WLA) for point sources and Load Allocations (LA) for nonpoint sources, including a margin of safety and natural background conditions. There are no National Pollution Discharge Elimination System (NPDES) pollutant sources present within the Middle Fork basin at this time. Therefore, the entire allocation specified within this TMDL is a LA for nonpoint sources only. In other words, the load capacity for the Middle Fork Payette includes a margin of safety and allocations of load to nonpoint pollutant sources.

While it is intended that loading analyses be a quantitative assessment of pollutant loads, federal regulations allow that 'loads may be expressed as mass per unit time, toxicity, or other appropriate measures' (40 CFR 130.2). In many cases, less data is available than may be considered optimal for a quantitative loading analysis. This can not delay TMDL development. In his September 26, 1996 ruling, Judge Dwyer made it clear that a 'lack of precise information must not be a pretext for delay' (see Idaho Sportsman's Coalition vs. Browner, Case No. C93-943 WD, WD Washington). Federal regulations also acknowledge the 'load allocations are best estimates of the loading, which may vary from reasonably accurate estimates to gross allotments' (40 CFR 130.2(g)).

For narrative criteria, e.g. sediment and nutrients, the measure of attainment of Idaho's water quality standards is full support of beneficial uses. Water quality targets are recommended in many instances of narrative criteria violations due to the long recovery period (i.e., greater than 5 years). Idaho's short TMDL development schedule and the regulatory allowances mentioned above point to phased or iterative TMDL load capacity estimates. In these types of TMDLs much is yet unknown and the initial loading analysis may be inexact with a large margin of safety to account for uncertainty.

The load capacity and allocations proposed for the Middle Fork Payette River within this TMDL are based on the results of an analysis of reach transport capacity. This analysis utilizes the current reach geometry characteristics, estimated background sediment levels from BoiSed, the Parker Transport Capacity Equation, and a sediment transport coefficient. Essentially, background sediment rates are estimated using BoiSed; the amount of sediment transported to a stream from an upslope activity is estimated using a

sediment transport coefficient; and the transport capacity and rate of deposition down the mainstem of the Middle Fork Payette is estimated using the Parker Transport Capacity Equation. The rate of sediment deposition was then increased until the rate of deposition within each reach was 50% above estimated background deposition rates. This establishes the load capacity in terms of a "percent about background". Nonpoint land use load allocations and a margin of safety combine to make up the identified load capacity.

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3.2.3. Sediment Allocations and Margin of Safety

As already stated, TMDLs are defined in 40 CFR Part 130 as the sum of the individual Waste Load Allocation (WLA) for point sources and Load Allocation (LA) for nonpoint sources, including a margin of safety (MOS) and natural background conditions. And, the Middle Fork Payette TMDL addresses pollutant loading from nonpoint sources only. Allocations are presented for each of the impaired reaches of the Middle Fork Payette River. These allocations specify load capacities, target nonpoint management load allocations, and a margin of safety based on the estimated background loads for each of the contributing areas to the impacted reaches. The load allocation in terms of "percent above background" identified for each sub-watershed are estimated based on the portion of the total load that can be contributed by management activities.

Where uncertainty exists (and this is almost always the case) about the amount of pollutant a water body can reasonably assimilate, federal law requires a margin of safety (MOS) be included in the calculations. The MOS may be numerical or be incorporated in conservative assumptions used to establish the TMDL. The MOS is intended to ensure that water quality goals will be met even though uncertainty in the loading capacity exists.

Table 12 summarizes the results of these transport capacity estimates for each reach analyzed. Reaches 5, 6, and 7 (see bold) are the impaired reaches. Load capacities and allocations are established for the contributing areas to these three reaches. The contributing area for Reach 5 includes the entire sub-basin area upslope and upstream of a point just downstream of the confluence between Lightning Creek and Middle Fork Payette River. The contributing area for Reach 6 includes the entire sub-basin area upslope and upstream of a point just upstream of the confluence between Anderson Creek and the Middle Fork Payette River. The contributing area for Reach 7 is the entire Middle Fork Payette sub-basin drainage.

Table 12: Sediment Input Rate Results by Reach

	Torge	Background	Background	Target Rate	Load	Cumulative
	11,200,000,000,000	Input Entering	English State (State Control of State Co	of	Capacity	Load Capacity*
		MF Payette	Deposition			(% above
Rea	ch 💮	(tons/yr)	(tons/yr)	(tons/yr)	background)	background)
Rl	-4444	78.3	4.6	6.9	50	50 a 17 as 1 km2 1
R2		11.0	. 3.3	5.0 9 5 5 5 5 6 9	.44	1 48 Sanza (N. 1964) 20
R3		58.4	2.5	3.8	49	47
R4		22.9	0.9	1.3	50	48
R5	mine Paliti.	76.3	17.9	26.8	56	50 - 2414
R6		60.3	39.5	59.2	26	46
R7	A.	75.0	32.5	48.7	48	47

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*Based on increases to BoiSed background amounts delivered to each stream reach.

These results are based on estimated average annual background sediment input rates entering the Middle Fork Payette River. Current cross-section geometries at selected points have been used to represent average reach conditions. These simplifications combine with the annual variability for flow and sediment input to make it unlikely that the exact deposition rates estimated here would ever be present within the Middle Fork Payette River. While it is apparent that the current levels of hillslope sediment production are "excessive" based on the support status of the lower reaches, the degree of excess sedimentation is difficult to quantify. By selecting an estimated increase in reach deposition of 50% over background it is recognized that the current sediment load will need to be reduced by half and that, through these reductions, improvements to the lower reaches will occur.

This TMDL establishes a sediment production threshold for the impaired reaches (R5, R6, and R7) that will achieve the Idaho water quality criteria for sediment and beneficial use support. A sediment load capacity and allocations for nonpoint management activities within the Middle Fork Payette River for these three reaches are proposed by this TMDL in terms of a "percent above background". Table 13 lists the management target input in both "percent above background" and "tons per year" for each of the subwatersheds. The "tons per year" estimates are a function of estimated background loads based on the research conducted at the Silver Creek Experiment Area adapted for use in BoiSed.

Table 13: Load Capacity, MOS, and Management Targets

¥.^.	Cumulative Load Capacity	Cumulative Load	Cumulative Background	Cumulative Margin of	Gumulative Management	Cumulative Management
Dooch	(% above ∷ ×	Capacity	Lord	Safety	Allocation	Allocation (%
Reach RI	background) 50	(tons/yr) 4624	(tons/yr) 3083	(tons/yr) 462	(tons/yr) 1079	above bkgrd) 35
R2	48	5600	3761	560	1279	34
R3 .	. 47	10164	6883	1016	2260	33
R4 R5	50	11867	8002		2678	33
R6	46	.13391 15076	8978 16317	1339 1508	3074 3251	34 32
R7	47	16806	11470	1681	3655	32

Current load estimates, also in terms of "percent above background", as estimated by the SedMod sediment production model (Glass, 1998) are presented in Table 14 to show preliminary sediment reductions required for the impaired reaches. Each of the required sediment reductions apply to the entire contributing areas of each of the impaired reaches, for all times of the year, for all forms of sediment inputs to the Middle Fork Payette River.

Table 14: Current Cumulative Sediment Loads, Cumulative Management Allocations, and Required Sediment Load Reductions*

	2 2 3 4 5 2 5 5 5 6 C C	of the of the state of	Company of Many at		
	Cumulative	Cumulative	Required		
	Current Load	Management	Sedimen	t en	
	Estimate (%	Allocation (%	Load Re	duction	
Reach	above bkgmd)	above bkgrnd	a on income a commentation of the comment of the co	bkgmd)	
Rl	35	35	. 0	4 1 4 2 10 3 3	
R2	39	34	5		
R3	62	33	29	a this country on	
<u>R4</u>	64	33	31_		
R5	54 at a part (54 a	34 903 95 №	20		
R6	67	32	35		
<u>R7 · · · · </u>	65	32	33		

^{*}Current load estimate for percent above background based on SedMod (Boise Cascade, 1998).

Land use and related activities within the Middle Fork consist of related timber harvest activities and recreations in all of the sub-watersheds except Pyle. Therefore, the allocations established for Reach 5 are for those activities related to timber harvesting and recreation. Allocations established for Reaches 6 and 7, which receives contributions from the Pyle sub-watershed, however, apply to agricultural, grazing, and urban nonpoint source activities in addition to timber harvest and recreation related nonpoint source activities. Table 15 shows the breakdown in acreage and in the proportional contributions of each of the identified activities within the Pyle sub-watershed that contribute to the nonpoint sediment load according to a proportioning analysis conducted using the Watershed Erosion Prediction Project (WEPP) model (Agricultural Research Service, 1997; Elliot et al, 1997; Flanagan and Livingston, 1995; IDEQs, 1998).

Table 15: Nonpoint Source Activity, Acres, and Proportion of load from the Pyle Sub-Watershed

Activity	Acres	Proportion of Sec	liment Load	
Roads	471	97.4%	a di kanggaran menangka Manangkan dari	N
Pasture	2UKK)	2.0%	\$ \$ 10.50 to 1	
Hay: 0-5% Slopes	1500	0.0%		
Hay: 6-20% Slopes		0.4%		a Milyaliya Salim
Urban	640	0.1%		
New Construction: 0-5% Slopes	25	0.1%	mini festigi isti	
New Construction: 6-20% Slopes	6	0.1%		
Forest	11418	0.0%		TORY OF
Total	19560	100%		

Note that the roads listed in this table are owned by a variety of agencies and are used for timber harvest, recreation, residence access, and agriculture and pasture access. Also note that the allocations specified for Reaches 6 and 7 include the entire contributing areas for each of these reaches, of which the Pyle subwatershed composes a small portion. Refinement of these allocations will be required during the

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development of specific actions for sediment reductions during the implementation phase of this TMDL.

A complete loading analysis, in conjunction with an implementation plan, lays out a general pollution control strategy and an expected time frame in which water quality standards will be met. For narrative criteria, e.g. sediment and nutrient, the measure of attainment of Idaho's water quality standards is full support of beneficial uses (IDEQb, 1998). Long recovery periods (greater than five years) are expected for implemented TMDLs dealing with non-point sediment sources. Because of the expected long term recovery periods, the Middle Fork Payette River TMDL allows for short term increases in sediment production as a result of restoration and timber management activities that will reduce overall sediment production in the long term. Water quality targets in these cases may be recommended by the IDEQ to ensure overall TMDL compliance.

The Clean Water Act §303(d) specifies that, for those waters identified as water quality limited, a TMDL must be established "at a level necessary to implement the applicable water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning that relationship between ... these ... limitations and water quality" (emphasis added). This TMDL meets these requirements by establishing sediment targets within the Middle Fork Payette Sub-basin Assessment and TMDL in terms of a "percent above background" based on the bankfell discharge from the Middle Fork Payette River resolved into an estimated annual background and current annual sediment load. This means that the allocations established by this TMDL are in terms of a percent above background of the annual sediment load. Flexibility to quantify the load capacity and allocations in annual verses daily sediment loads is provided in 40 CFR Part 130.2(i). Note that the Middle Fork Payette River is an unregulated system. flows occur according to seasonal patterns and annual variations. Therefore, the annual allocations established reflect the Middle Fork Payette seasonal patterns and annual variations due to the flexibility inherent in evaluating the sediment yield in terms of a "percent above background". The IDEO asserts that if these sediment targets are attained the support of the beneficial uses will improve. Additionally, the IDEO expects these sediment targets to be adjusted over time as progress towards beneficial use support is made and efforts to improved current sediment load estimations continue. Specific on going efforts to improve current sediment loads within the sub-basin are described more fully in Section 4. The state of the s

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This TMDL establishes a hillslope sediment production threshold. It should be noted that the transport capacity model uses physical parameters and inputs that are not based on conservative assumptions, however, the load capacity specified includes not only surface crosion, but mass wasting contributions as well. Therefore, in addition to the margin of safety that has been applied, the allocations are considered conservative due to the use of background estimates that include mass wasting.

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4. Implementation Plan Development Strategy

The IDEO is currently finalizing guidance for development of TMDLs. This guidance suggests that implementation plans are an essential step in the process of restoring beneficial uses and assuring compliance with water quality criteria. These plans lay out a schedule of specific actions to be undertaken and are to be developed in accordance with the water quality goals and load allocations provided in a TMDL. Draft IDEQ guidance for implementation plan development states:

"An implementation plan is guided by an approved TMDL and provides details of actions needed to achieve load allocations, a schedule of those actions, and follow up activities to document progress or provide other desired data. Implementation plans specify the local actions that lead to the goal of full support of beneficial uses. Important elements of these plans are:

- Planned actions are based on the load allocations in the TMDL Time line which specifies when water quality standards are expected to be met, including goals or milestones as deemed appropriate
- Schedule of what, where, and when actions to reduce loads are to take place
- Identification of who will be responsible for undertaking each planned action
- Specification of how accomplishments of actions will be tracked
- Follow-up monitoring plan to refine TMDL and/or document attainment of water audity standards, including details of evaluation and reporting of results

There may be more than one implementation plan which cover different water quality limited waterbodies within a sub-basin. An implementation plan (or plans) is expected within 18 months of approval of a TMDL.

Writing of these plans is the charge of the WAG and designated agencies in Idaho's water quality law, with assistance from IDEQ. IDEQ will be a repository for implementation plans and will incorporate them in the Idaho's Water Quality Management Plan" (IDEQb, 1998).

As the draft guidance suggests, "a complete loading analysis, in conjunction with an implementation plan, lays out a general pollution control strategy and an expected time frame in which water quality standards will be met. For narrative criteria, e.g. sediment and nutrient, the measure of attainment of Idaho's water quality standards is full support of beneficial uses. Long recovery periods (greater than five years) are expected for implemented TMDLs dealing with non-point sediment or temperature sources. Along with the load reductions, these targets set the sidebourds in which specific actions are scheduled in the subsequent implementation plan" (IDEQb, 1998).

Because of the expected long term recovery periods, the Middle Fork Payette River TMDL allows for short term increases in sediment production as a result of restoration and timber management activities that will reduce overall sediment production in the long term. Water quality targets in these cases may be recommended by the IDEO to ensure overall TMDL compliance.

The draft IDEQ TMDL development guidance also suggests that monitoring to ascertain achievement of water quality goals is an essential part of implementation plans. Instream monitoring and assessment of water quality is to be done by IDEQ. Implementation monitoring will be done by designated state agencies as defined in IDAPA 16.01.02.003.23 (IDEQb, 1998).

4.1. Mechanisms for Implementation of Nonpoint Source Reductions

Nonpoint source reductions listed in the Middle Fork Payette TMDL will be achieved through the combined authorities the State of Idaho possesses within the Idaho Nonpoint Source Management Program and commitments the community makes in the future Middle Fork Payette Sub-basin Implementation Plan. Section 319 of the Federal Clean Water Act requires each state to submit a management plan to EPA for controlling pollution from nonpoint sources to waters of the state. The 319 Plan must do the following: identify programs to achieve implementation of the best management practices (BMPs); outline a schedule containing annual milestones for utilization of the program implementation methods and for implementation of BMPs; and provide a listing of available funding sources for these programs. The current Idaho Nonpoint Source Management Program has been approved by EPA as meeting the intent of Section 319 of the Clean Water Act.

As described in the Idaho Nonpoint Source Management Plan, the Idaho Water Quality Standards require that if water quality monitoring indicates water quality standards are not met due to nonpoint source impacts, even with the use of current BMPs, the practices will be evaluated and modified as necessary by the appropriate agencies in accordance with the provisions of the Administrative Procedure Act. If necessary, injunctive or other judicial relief may be initiated against the operator of a nonpoint source activity in accordance with the Director's authorities provided in Section 39-108, Idaho Code (IDAPA 16.01.02.350). The Idaho Water Quality Standards list designated agencies responsible for reviewing and revising nonpoint source BMPs based on water quality monitoring data as is generated through the state's water quality monitoring program (IDAPA 16.01.02.003).

Existing authorities and programs to ensure implementation of BMPs to control nonpoint sources of pollution in Idaho include:

State Agricultural Water Quality Program
Wetlands Reserve Program
Environmental Quality Improvement Program
Idaho Forest Practices Act
Water Quality Certification For Dredge and Fill

Nonpoint Source 319 Grant Program
Conservation Reserve Program
Resource Conservation and Development
Agricultural Pollution Abatement Plan
Stream Channel Protection Act

As designated "Responsible Land Management Agencies", both the USDA Forest Service and the USDI Bureau of Land Management have entered into a Memorandum of Understanding (MOU) between the EPA and various State of Idaho agency departments (IDHW, 1993). Within the Forestry Practices Appendix to this MOU, the federal agencies have agreed to comply with the water quality protection provisions of the Idaho Forest Practices Act Rules and Regulations. Additionally, federal agency responsibilities are defined in 40 CFR Part 130 as needing to comply with State requirements to control water pollution to the same extent as private entities.

Upon approval of this TMDL by EPA Region 10, a Middle Fork Payette River TMDL Implementation Plan will be developed by designated supporting agencies and stakeholders. The Idaho Water Quality Standards directs appointed basin and watershed advisory groups to provide public review on recommended actions to achieve the water quality target listed in the Middle Fork Payette River TMDL.

The Middle Fork Payette River TMDL Implementation Plan will aim to be the most appropriate plan for nonpoint sediment source pollution controls. The Plan will list activities which are to be implemented by land managers within the community to enhance the water quality of the Middle Fork Payette River. The Plan will include specific actions to meet the TMDL targets and a schedule for implementation of each activity. These activities might include, but are not limited to: forest road reconstruction, road closures, ongoing road maintenance programs, slide stabilization projects, riparian tree plantings, agricultural best management practices, bioengineering structures, wetland restoration, urban storm water system upgrades, development of a tax relief policy for riparian areas, development of an erosion control ordinance and education and information programs to increase community awareness of the river's water quality conditions and the activities to be undertaken to restore the river's water quality.

4.2. Ongoing Efforts to Assess Current Sediment Loads

Idaho's short TMDL development schedule and the regulatory allowances point to phased or iterative TMDLs. In a phased TMDL much is yet unknown and the initial loading analysis may be inexact. The initial phase focuses on what is known. Progressive load reduction moves toward the eventual goal by targeting more obvious source problems in the implementation plan. Essential to this approach is inclusion, in the implementation plan, of a plan to gather the data needed to refine load estimates and their allocation. On going efforts to assess sediment loads within the Middle Fork Payette basin are presented here, with the caveat that these and other efforts will be better refined as the implementation plan is developed.

The IDEQ welcomes the assistance of other agencies, or private organizations, with the resources and interest in TMDL implementation plan development and on going efforts to assess current pollutant loads. Additionally, the IDEQ recognizes that many others hold information and expertise and encourage these agencies to work with the appointed Middle Fork Payette Watershed Advisory Group and stakeholders during TMDL development and implementation (IDEQb, 1998).

On going studies relevant to the Middle Fork Payette River Sub-basin in general, but not necessarily to the establishment of this TMDL, include: 1) baseline monitoring sites (USDA Forest Service, Boise National Forest); 2) Idaho Department of Water Resources Basin Plan; and 3) IDEQ Bull Trout Problem Assessment. Additional on going studies relevant to the Middle Fork Payette River Sub-basin specific to sediment load descriptions and analysis include; 1) a land slide inventory (Boise Cascade Corporation); 2) SedMod model application refinements and general model refinements; 3) Idaho Department of Lands Cumulative Effects Watershed Procedure; and 4) Middle Fork Payette River Sediment Trend Monitoring (EPA, IDEQ, and USDA Forest Service, Boise National Forest).

4.2.1. Landslide Inventory

The need for an adequate prediction and planning tool to assess background and management induced rates of mass wasting was identified as a serious data gap during the development of this TMDL. However, the lack of appropriate historical data, combined with a lack of an adequate sub-basin reconnaissance for current land slide features, prevented the development of this prior to submittal of this TMDL.

In order to address this data gap, the Boise Cascade Corporation has begun to develop a GIS based land

slide inventory data set on current and historical land slide events within the region (Glass, 1998). This effort is being conducted in cooperation with the USDA Forest Service, IDEQ, and others. Because the sediment reduction targets established by this TMDL include a mass wasting component, it is important for this effort to continue in a cooperative manner with all effected responsible land management agencies so that they may justify and defend their management actions within the Middle Fork Payette sub-basin.

4.2.2. Boise Cascade SedMod Model Improvements

Improvements are in the process of being made to Boise Cascade's SedMod sediment prediction model. These improvements include a quality control check for stream initiation locations within the Middle Fork Payette River sub-basin in addition to modifications to the SedMod model itself (Glass, 1998).

4.2.3. Idaho Department of Land's Cumulative Watershed Effects Procedure

A Cumulative Watershed Effects (CWE) inventory is expected to be completed by the Idaho Department of Lands during the summer of 1999. Field data collection and reconnaissance was finished during the fall of 1998, review and data reduction is planning to be completed during the winter of 1999, with the final report to be available summer of 1999.

The CWE process was developed in order to meet antidegradation provision specified by the Clean Water Act. The concept of cumulative effects suggest that, while impacts from any single forest practice may not exceed Idaho water quality standards if BMPs are properly applied, impacts from a series of practices may add up to Idaho water quality standard exceedences. The CWE process is designed to first examine conditions in a watershed surrounding a stream, then attempts to identify causes of the conditions, and finally, to identify actions that will correct any identified adverse conditions. It is the identification of actions to correct identified adverse conditions that should prove especially useful to the Middle Fork Watershed Advisory Group during TMDL implementation plan development.

4.2.4. Middle Fork Payette River Sediment Trend Monitoring

The purpose of the Middle Fork Payette River Sediment Trend Monitoring is to collect information on the surface water sediment conditions within the Middle Fork Sub-basin to: 1) isolate the form of sediment impairing beneficial uses (i.e., turbidity vs bedload impacts); 2) characterize existing sediment load trends; and 3) validate predictive sediment equations. This is a cooperative monitoring effort funded by the EPA and involving personnel from the EPA, IDEQ, and the USDA Forest Service. So far the data collected has provided: 1) stage: discharge relationships at two sites along the Middle Fork Payette River; 2) a general partitioning between suspended and bedload within the lower reaches of the Middle Fork Payette River; 3) the average particle size for captured bedload at two sites along the Middle Fork Payette River; 4) a general comparison between the bedload grain size captured and the substrate grain size at two sites along the Middle Fork Payette River; 5) estimated bedload vs discharge curves for two sites based on 11 bedload samples; and 6) estimated bedload vs discharge curves for 9 tributaries to the Middle Fork Payette River based on one bankfull discharge bedload measurement (Fitzgerald et al, 1998b).

4.3 Revisions to TMDL Objectives During TMDL Implementation Phase

As the draft IDEQ guidance for TMDL development states: "a phased approach is often appropriate when nonpoint sources are a large part of the pollutant load, information is limited, or narrative criteria are being interpreted" (IDEQb, 1998). Each of these considerations apply to the Middle Fork Payette TMDL. Under these circumstances there is a great deal of uncertainty in the loading analysis, load

Sub-basin Assessment and Total Maximum Daily Load for the Middle Fork Payette River

capacity and its allocation.

The draft IDEQ guidance for TMDL development suggests in these cases that: "this uncertainty calls for a "ramping up" of implementation in which the more obvious sources of load reduction are scheduled for action first, with increasingly difficult and less cost effective load reductions scheduled further out in time. Essential to this strategy is gathering of information which will allow refinement of the loading analysis and document when restoration of beneficial uses occurs. The implementation schedule may be revised if additional data indicate an upward revision in the loading capacity (less load reduction required to meet beneficial uses then at first estimated), better than anticipated load reductions, or that water quality standards are met prior to full implementation" (IDEQb, 1998).

5. Public Participation

IDEQ staff had numerous consultations and discussions with interested agencies and stakeholders during the development of the Middle Fork Payette River TMDL document. These agencies and stakeholders included the USDA Boise National Forest, the USDA Rocky Mountain Research Station, United States Environmental Protection Agency, Natural Resource Conservation Service, Idaho Department of Fish and Game, Idaho Department of Lands, Idaho Soil Conservation Commission, Boise County, Squaw Creek Conservation District, Boise Cascade Corporation., Idaho Conservation League, and local volunteers. The participation of these agencies and individuals has been, and will continue to be, important to the development of this and future documents within the Middle Fork Payette River sub-basin.

5.1. Southwest Basin Advisory Group

Idaho Code Title 39, Chapter 36 and IDAPA 16.01.02.052 provides requirements for public participation in TMDL development and water quality decisions. Basin Advisory Groups (BAGs) and, if formed, Watershed Advisory Groups (WAGs) are to review the development of the TMDL, advise Idaho State on impaired waterbodies, the management of impaired watersheds, and recommend specific pollution control activities.

The Southwest Basin Advisory Group (SWBAG) was appointed by the Administrator of the Idaho Division of Environmental Quality in 1996 to fulfill the public participation requirements of Idaho Code 39-3601 et seq. Under Idaho Code 39-3615, the SWBAG is charged with providing advice to the Idaho Division of Environmental Quality on the specific actions needed to control point and nonpoint source pollution impacting Middle Fork Payette River water quality. Members selected for the SWBAG were recommended from nominations obtained from the local community to represent specific stakeholder groups within the watershed.

The formation of a Watershed Advisory Group (WAG) for the Middle Fork Payette Sub-basin was suggested to the SWBAG through the public comments received. A WAG formation is expected to occur upon TMDL approval.

5.2. Middle Fork Payette Executive Committee and Task Force

The Middle Fork Payette River sub-basin assessment was originally a pilot effort by the IDEQ to determine the time, resources, and information needed to complete a sub-basin assessment. An interagency Executive Committee and Interdisciplinary Task Force was formed to provide guidance on Middle Fork Payette TMDL document development. This group met periodically throughout the development of this document.

5.3. Public Notification

To meet the various requirements for TMDL public involvement and review, the IDEQ completed the following steps:

- A 45 day comment period was held between September 3 and November 18,1998.
- Copies of the Draft Sub-basin Assessment and TMDL were presented to the SWBAG and cooperating agencies and stakeholders for review at their October 1st, 1998 meeting.
- Notices were published two times (Wednesday and Sunday) in the Idaho Statesman and the Idaho

Sub-basin Assessment and Total Maximum Daily Load for the Middle Fork Payette River

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- Notices contained a draft document description, locations of available draft copies; directions for submitting written comments, IDEQ agency contacts, and notification of the public meeting to be held in Garden Valley, ID.
- A public meeting was held at the Garden Valley Senior Citizen Center, Garden Valley, Idaho on October 28, 1998 to present the main findings of the draft document and to answer questions from the community.

A total of nine written comments were received from interested agencies and stakeholders, including an extensive comments signed by 23 individuals living and working within the Middle Fork Payette Subbasin. These comments were reviewed and discussed both internally and with the commenting party when possible.

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7. List of Abbreviations

BAG - Basin Advisory Group, §39-3601

cms- cubic meters per second

DEQ - Idaho Division of Environmental Quality

EPA - United States Environmental Protection Agency

ha - hectare

HUC - Hydrologic Unit Code

IDWR - Idaho Department of Water Resources

km - kilometer

km² - square kilometer

LA - Load Allocation, non-point source

m - meter

mg/L - milligram per liter

mi - mile

mL - milliliter

MOS - Margin of Safety

TMDL - Total Maximum Daily Load

t/y - tonnes per year

USDA - United States Department of Agriculture

USDI - United States Department of Interior

WAG - Watershed Advisory Group, §39-3601

WBID - Water Body Identification Number

WLA - Waste Load Allocation, point source

WQL - Water Quality Limited, Beneficial Uses not Fully Supported

§ - Section

§303(d) - section 303(d) of the Clean Water Act

°C - degrees Celsius

*F - degrees Fahrenheit

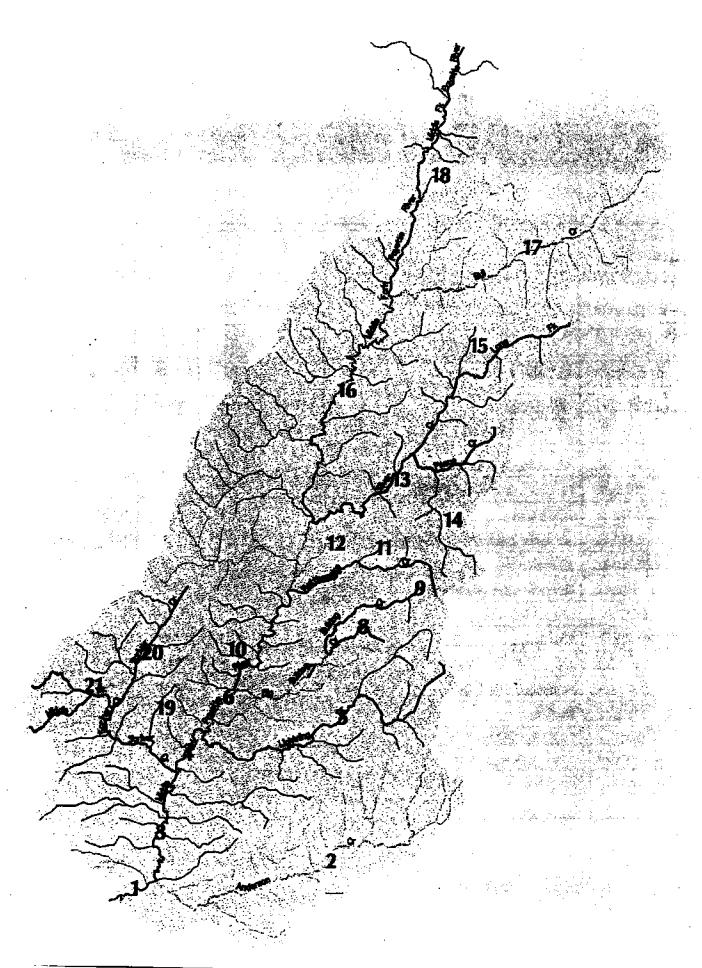
μg/L - microgram per liter

Appendix A: Middle Fork Payette River Subbasin Water Body Assessments

This appendix has been prepared to provide assessments and justification for the status of water bodies in the Middle Fork of the Payette River drainage. These assessments have been made by Bolie Regional Office of Idaho Division of Environmental Quality. These assessments have been completed following the latest understanding of assessment methodology, and relies heavily on the assumptions and guidelines of the 1996 Water Body Assessment Guidance.

For each water body there is a table that provides the listing and assessment history. The notes include assessment logic and justification.

Water Body Identification	Description	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Salmonid Spawning	Primary Contact Recrustion	Secondary Contact Recrustion
ID-17050121-01	MF Payette - Anderson to mouth	Full Support	Full Support	Not Fall Support	Full Sopport	Full Support	Full Support
ID-17050121-02	Anderson Creek		Full Support	Full Support	Full Support	Full Support	
ID-17050121-03	MF Payette - Seriver to Anderson	Full Support	Full Support	Net Fell Support	Full Support	Pull Support	Pull Support
ED-17030121-04	MF Payette - Lightning to Scriver	Full Support	Pul Support	Not Fall Support	Full Support	Full Support	Full Support
ID-17050121-05	Lightning Creek		Pail Support	Pull Support	Pull Support	Pull Support	
ID-17050121- 0 6	MF Payette - Big Bulldog to Lightning	Pull Support	Pall Support	Her Full Support	Pell Support	Full Support	Full Support
ID-17050121-07	Big Buildog - Buildog to mouth			Puli Support	Pull Support	Full Support	
ID-17050121-08	Big Buildog - headwaters to Building			Pallagran		Pull Support	
ED-17050121-09	Building Creek			Full Support		Full Support	
ID-17050[21-10	MF Payette - Rattlesnake to Big Buildog	Pull Support	Full Support	Fall Support	Full Support	Pull Support	Full Support
ID-17050121-11	Rattlesnake Creek			Full Support	Not Assessed	Pull Support	
ID-17050121-12	MF Payette - Silver to Rattlesnake	Full Support	Puli Support	Pull Support	Pull Sepport	Pull Support	Full Support
ID-17050121-13	Silver - Peace to mouth			Fail Support	Pull Support	Full Support	
ID-17050121-14	Peace Creek			Pull Support	Pull Support	Fall Support	
TD-17050121-15	Silver > bendwaters to Peace			Pull Despois	Fell Support	Pull Support	
ID-17050121-16	MF Payette - Bull to Silver	Full Support	Pull Support	Pall Basedit	Full Support	Full Support	Pull Support
ID-17850(21-17	Buil Creek			Poll Support	Pull Suspen	Full Support	
ID-17050121-18	MF Payette - headwaters to Buil			Full Support	Full Support	Full Support	
ID-17050121-19	Scriver - MF Scriver to mouth			Pell Support	Pull Support	Full Support	
ID-17050121-20	Scriver - headwaters to MF Scriver	. 4		Pull Support	Pull Support	Pull Support	•
ID-17050121-21	MF Soriver Creek		2.42	Pell Support	Fell Support	Fall Support	



Designated Beneficial Uses for this water yes yes yes no yes no yes	Carrent Classification	n is Idoho W-	PNRS: 703.00 ter Onality St	anderde			rk Payene Riv	All Wales)
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ID-17050121-01

Middle Fork Payette River

upstream limit: Anderson Creek

但的 美国教训练 PNRS: 703.00

downstream limit: South Fork Payette River

§303(d) listed: yes cause: sediment	assessment in	fo: DEQ '96 W	BA				right.
Idaho's Beneficial Uses: IDAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Biota	Selmoned Spawning	Primary Contact Recreation	Secondary Contact Recreation
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1998 Sub-basin Assessment Informa	tion						ž.
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Designated Beneficial Uses for ID-17050121-01:	yes	yei - Salkaran sa	yes	RO	yes*	yes	B0**

Notes: ID-17050121-01 Middle Fork Payette River

This water body includes the downstream most segment (river mile 0 to 2.5) of the Middle Fork Payette River, several unmanued ephenocral streams, and an unnamed percential stream. The Middle Fork Payette River is a fourth order stream and classified as a C5 Rosgen stream type. The bed and banks are dominated by sand with occasional gravel and silt/clay. Air photos and recent flyover of the area show that the stream is channelized compared to historic conditions. The historic channel had higher sinusaty. There are still some abandoned meander ponds and traces of meander bends on the ground.

The lowing adjacent to this segment has been developed. The town of Crouch is located at the upper end of the segment. Most Crouch urban and suspicipal facilities acquire lively water from wells and dispose of waste water with septic systems. Much of the low lying land immediately adjacent to the Middle Fork Payette is used as pasture or wetland sinks. Roads cross the Middle Fork Payette three times during the length of this water body. There are about 20 homes (Rivers Point Subdivision) along the river near the confluence with the South Fork

This segment of the Middle Fork Psyctic River was first monitored by DEQ on August 20, 1997. One site (97SWIROB72) was established just upstream from the confluence with the South Fork Payette River. When requested, no other data was submitted by agencies for this assessment, specific to this water body. Additional investigations include Middle Fork Payette River TMDL Sediment Trend Monitoring (Fitzgerald et al. 2/9/98) and routine drinking water sampling for the Rivers Point Subdivision water system. A site was established this year at Davey's Bridge for the Middle Fork Payette River TMDL Sediment Trend Monitoring project. At this site we have begun measuring discharge, suspended sediment, turbidity, bed load, and developing a channel cross section.

Suckers, and to a lesser extent, whitefish, are the predominate large fish species currently utilizing this segment of the Middle Fork Payette River. This segment is appropriate for and utilized by three species of native salmonid fishes, mountain whitefish (Prosopium williamsont), redband trout (Oncorhynchus mykiss), and bull trout (Salvelinus confluentus). While specific fishery monitoring data do not exist for this segment, information from similar, neighboring segments, and observation show that mountain whitefish propagate in, and year round inhabit water bodies of this type and condition. Redband trout (residualized steelhead), planted rainbow trout (O. mykist) and built trout are limited by lack of complexity to the habitat. Redband trout, and planted rainbow trout occasionally use this stream and would be more abundant, year round if habitat complexity and cover were increased. Redband/Rainbow trout have been observed using schools of suckers for cover. The most sensitive salmonid in the basin are built prout. It is essential that built trout be able to better utilize this segment for migration to the rest of the Payette built trout populations. This segment is also critical to built trout as overwintering habitat for adult and sub-adult fluvial (large stream migrating) built trout. Built Trout has been ancedetally observed utilizing one to the few pools near Crouch. Surveys are needed to better understand these and other non-game native fishes of the watershed.

Aquatic insects and other macroinvertebrates also inhabit this segment. DEQ's aquatic insect monitoring protocol calls for monitoring of aquatic insects in riffle habitat units. The insects collected in 1997 were collected for the run habitat. The 1997 samples were also collected from select portions of the streams that had gravel substrate. This was done to closest mimic what would be found in a riffle habitat if one existed. These samples are by no means definitive but they do give us a good idea of the condition of the aquatic insect community, and from that, the relative status of the water quality. The collected insects were of assemblages that generally indicate good water quality. The insects are also indicative of a depositional environment. Fresh water clams/mussels were abundant, which also indicate good water quality in a depositional environment.

The habitat in this segment is in a poor condition for fish. It is apparent that fine sediment (sand sized) inputs exceed stream carrying capacity much of the year. Lower portions of the stream have few if any pools, and the stream is becoming wider and shallower. Sand sized sediment dominate channel bed and banks. Gravel/boulder bars are seldom and are continuously covered by fine sediment after being exposed for short periods during low flow. Pools and to some extent riffles and glide habitats are missing. Fine sediment beds with thin vancers of water flowing over their top are predominant. The stream bed is dominated by sand ripples, dunes and antidime structures. The few existing pools are usually the result of hard structures that confine and accelerate water. like bridges, bank barbs, or light radius meanders.

As far as it is known, this water body is free of water column pollutaries, excepting high levels of event driven suspended sediment. It is not clear if and how this suspended sediment impairs beneficial uses. The status of the nucrobious, such as bacteria and other pathogens, is unknown and many accel further investigation.

Numeric criterion in Idaho's Water Quality Standards have not been exceeded by any data generated from sampling this water body. The amount of bed load sediment in this segment do impair Cold Water Blota, and therefor exceed Idaho's parrative sediment criteria (IDAPA 16.01.02.200.08.)

There is a withdrawal of surface water at Rivers Point Subdivision from this segment, for domestic water supply. Rivers Point Subdivision water supply system has been operating since 1975 and has not reported any chronic raw water problems. All water supply and recreational beneficial uses have been "full support" for the last five years. Submonid Spawning beneficial use is also "full support". The all but incidental spawning native submonid is the mountain whitefish. Mountain whitefish are broadcast spawners and apparently successful in Middle Fork Payette river and neighboring streams. Redband trout spawning is onlikely and built trout spawning is only going to occur much further up to the watershed. Cold Water Blota beneficial use is impaired and is "Not Full Support". As discussed earlier, cold water blots, redband trout and built trout, find habital quality not sufficient to utilize the area. Their use of this segment is crucial to the long term survival of both species.

Using \$305(b) terminology the "cause" of the "Not Full Support" call for Cold Water Blota is excessive hed load arithment, and is compounded by a channelized stream. The "source" for excessive sediment is limited to non-point source activities. These activities include routs, bank failures, forest practices, agricultural practices, natural landslides and to a minor extent storm water management and direct dumping farther up in the watershed and along the tributaries.

It is important to note that loss of anadomous fish, introduction of non-native fishes, and contry stocking of hatchery fish for a "put and take fishery" have greatly affected the complex interactions of the remaining native salmonids (S. confinentus, O. mykin, and P. williamsont). It is difficult to define or assure recovery, given these other population controlling issues.

ID-17050121-02	Anderson Ci	reek		mit: beadwaters	en dikabasa	ในสมสัตร์ได้ได้เล้า ก	k
	PNRS: 704.0	ю 🧦	downstream	ı limit: Middle l	Fork Payette R	iver	
Current Classification in Idaho W	ater Quality	Standards					
map code: map codes not This water available for unclassified water bodies	body is: Uncl	assified				Special Resource 1.02.95; no	
Idaho's Beneficial Uses: IDAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Biota	Salmonid Spawning	Primary Contact Recreation	Secondary Consect Recreasion
Designated Beneficial Uses for this water body:	no	80	yes*	no	EO	yes*	ao 2
	* denotes in	nplicit designati	ion through ID/	PA 1601.02.10	I.01.a.		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1988 §305(b) and §303(d) Informa §303(d) listed: no cause:		info: not assess	ed in 1988				
Idaho's Beneficial Uses: IDAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Biota	Salmonid Spewajog	Printery Contact Recreation	Secondary Contact Recreation
status assessment for 1988			,				
1992 §305(b) and §303(d) Informa	tion						
§303(d) listed; no :ause:	assessment i	info : not assess	ed in 1992				eriyi Yan
Idaho's Beneficial Uses: DAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Bints	Werm Water Biota	Selmonid Spawning	Primary Contact Recreation	Secondary Contact Recrussion
tatus assessment for 1992	<u> </u>						
994 §305(b) and §303(d) Informat	tion			-			
303(d) listed: yes auso: sediment	assessment in Forest analy		odics assessed	in 1994. 393(d)	listing resulte	d from Boise N	lational
daho's Beneficial Uses: DAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Biota	Selmonid Spawning	Primary Contact Recrettion	Secondary Contact Recrustion
tatus assessment for 1994		i i					
996 §305(b) and §303(d) Informat	ion						
303(d) listed: yes nuse: sediment	assessment in Forest analy	afo: no water b sis.	odies assessed	in 1996. 303(d)	listing resulted	1 from Boise N	ational
faho's Beneficial Uses: DAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Biota	Salmonid Spawning	Primary Contact Recreation	Secondary Contact Recreation
tatus assessment for 1996	r	 					

Anderson Creek	upstream limit: headwaters	
PNRS: 764.86	downstream limit: Middle	Fork Payette River
Information		
assessment info;		
		Selectoris Primary Secondary Spatienting Contact Contact Recreation Recreation
rmation .		
TMDC stehus: No TMI	I. Planard	
		Spanning Printer Contact Recreation
Pull Suppor	Fall Support	Poli Fall Support Support
Idaho Water Quality St	ındards	
		Solviered Princey Secondary Spenising Connect Recreation Recreation
я о уса	уел не	yes* yes #0**
	Agricultur Agricultur Water Supply Descript Permation TMDL status: No TME Descript Water Supply Permation Descript Permation Descript Permation Agricultur Water Supply Agricultur Agricul	PNRS: 704.80 downstream limit: Middle Laformation Agricultural Cold Water Warm Westr Blota TMDL Status: No TMDL Planned TMDL status: No TMDL Planned Present: Ware Supply Res Supply Blota Present: Ware Supply Blota Pull Full Support Read Support Lidaho Water Quality Standards Present: Ware Supply Blota Plan Water Bloca Read Support Lidaho Water Quality Standards Plan Water Bloca Plan Water Bloca Plan Water Bloca Read Support Read Support Lidaho Water Quality Standards Plan Water Bloca Plan W

Notes: ID-17050121-2 Anderson Creek

This water body includes Anderson Creek from its headwaters to the Middle Fork Payette River. There are several tributaries to the main stem of Anderson Creek, Brush Creek, Little Anderson Creek, Cow Creek, Burn Creek, Hailey Creek, Granite Creek and East Fork. Anderson Creek is a third order stream from the confluence with the Middle Fork Payette River to Little Anderson Creek and is generally classified as a B Rosgen stream type. The bed and banks are dominated by cobbite followed by gravel, boulders and sand.

The lower three miles of Anderson Creek slows through private land, with some development. The watershed also includes forest service land in the headwaters and BLM land instruces the forest service and private land. The town of Cronch is located on the west side of the Middle Fork Payette River, across from the confluence with Anderson Creek. Drinking water for development in the area is supplied by wells, and wastewater disposal utilizes septic tanks. Some of the low lying land immediately adjacent to Anderson Creek is used as pasture or wetland sinks. Near the confluence with the Middle Fork Payette River, there is an arene. Forest Service Road 668 parallels Anderson Creek for almost its entire length and crosses once during the length of this water body. At this road crossing Anderson Creek is diverted for two major canals. A private road crosses Anderson Creek near the confluence and dead ends about one mile upstream on the north side.

Anderson Creek was first monitored by DEQ August 12, 1993. Four sites exist on Anderson Creek.

300 300

Site ID	17.7	 Location		MBI	H
93SWIRO18		forest service boundary		3.83	NΑ
96SWIROA76		100 yards downstream from Burn Creek	5.30	95	
96SWIROA77		bridge @ L. Anderson Creek confluence	4.50	~ 95	•
97SWIROB73		bridge @ L. Anderson Creek confluence	4.24	49	

The forest service also submitted baseline inventory information taken September 19, 1986. This inventory concludes that invertebrate production is poor, and the stream had very poor fish habitat due to excess fines. DEQ invertebrate and fish samples disagree with these conclusions. The fish population was surveyed during the BURP monitoring performed at 96SWIROA77 on August 6, 1996. The results were

two age classes of rainbow trout (O. mykiss) (6 fish) and 33 Sculpin.

水源基种变性 (14)

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Two of the BURP sites, 97SWIROA77 and 97SWIROB73, and the BNF baseline inventory site were taken at the same spot. Habitat evaluations vary greatly. Both the 97SWIROB73 and the BNF baseline evaluations were following habitat degrading events. New years day 1997, rain on snow event occurred and in 1986 there were fires in the area. Both of these evaluations show excess sediment not found in the 1996 monitoring. Anderson Creek needs more intense, and trend monitoring to determine impairment due to habitat.

Sources (H. Malany and others, unconfirmed) tell that there used to be a significant brook trout fishery in the upper portions of Anderson Creek. On past timber sales, persons would hike all the way down the hill side to fish for, and catch, many brook trout. Current studies demonstrate that self proclaimed "good anglers" commonly mistake salmonids (Schill, 1998). Brook trout have not been found. Built trout and rainbow may have been mistaken for brook trout.

Aquatic insects and other macroinvertebrates also inhabit this segment. These samples are by no means definitive but they do give us a good idea of the condition of the aquatic insect community, and from that, the relative status of the water quality. The collected insects were of assemblages that generally indicate good to excellent water quality.

The habitat in this stream is in questionable condition for fish. Cobble (64-256 mm) dominate channel bed and banks. Gravel/boulder bars are frequent. Pools make up about 25% of the stream with the remainder dominated by riffles.

As far as it is known, this water body is free of water column contamination, excepting high levels of event driven suspended sediment. It is not clear if and how this suspended sediment impairs beneficial uses. Anderson Creek was impacted by the rain on snow event in January 1997. A considerable amount of sediment was delivered to the system and eventually to the Middle Fork Payette River. The stream gradient does not allow for significant deposition of fine sediment, however, the finitual score for the 1997 BURP monitoring indicate an impact to the riparian area. Due to a lack of development in the upper reaches of the stream, bacteria counts should be low.

Numeric criterion in Idaho's Water Quality Standards have not been exceeded by any data generated sampling this water body. Based on current assessment protocols, the previously mentioned BURP monitoring indicate this stream falls into the category of "full support" for cold water blota beneficial use. Domestic Water Supply, Warm Water Biota, and Secondary Contact Recreation are neither designated nor existing and therefore have not been assessed. Agricultural Water Supply and Primary Contact Recreation appear to be in the "full support" category. With the absence of anough fish information a call of salmonid spawning status can not be made at this time.

ID-17050121-03 Middle	Fork Payet	. com v San San San	ppstream limi downstream l	t: Seriver Cre imit: Anderso			in.	
Current Classification in Idaho Wa	ter Quality S	Standards						
ap code: SWB-322 This water body is: Classified						Designated Special Resource Water: IDAPA 16.01.02.95: yes		
daho's Beneficial Uses: DAPA 16.01,02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Bigta	Salmonid Spawning	Printary Contact Recreation	Secondary Contact Recreation	
Designated Beneficial Uses for this water ody:	yes	yes livit decienati	yes	1601 07 10	yes	yes	yes	
988 §395(b) and §303(d) Informati		hucr ocalina	hi anoter toan	3 3 3			i. Ži	
303(d) listed: no mise:		ifo: evaluated						
latio's Beneficial Uses: DAPA 16.01.02:100	Domesic Water Supply	Agricultural Water Supply	Cold Water	Wasan Water Biotia	Salayonid X	Princety Country Respection	Secondary Contact Recreation	
atus assessment for 1988	Full Support	Full Support	Feli Support	ंक्षेत्रकों तु के	Full Support	Full Support	Full Suppor	
992 §305(b) and §303(d) Informati 03(d) listed: so use:		fo : not assess	ed in 1992					
uho's Beaeficial Lises; APA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water	Warra Water Biota		Princery Constant Recommission	Secondary Connect Repression	
itus assessment for 1992								
94 §305(b) and §303(d) Informatic		and the second s						
03(d) listed: yes se: eddiment	essessment in Forest analys		dies assessed in	1994. 303(d	listing resulted	fram Brise N	etional	
bo's Rescholel Ness APA 16.01.02.160	Domestic Water Supply	Agricultures Water Supply	Cold Water Bleen	Water Water	Salvania Salvania	Primary Control Research	Secondary Connect Reconstion	
bis assessment for 1994			·	-			1 13 v	
96 §305(b) and §303(d) Informatio 13(d) listed: yes ise: sediment	and the manager of the second of	o: no water bo		i de pos	listing resulted	Same of the	idonal	
ho's Bezefficial Uses: APA 16.01 02 100	Domestic Water Supply	Agricultural Water Supply	Cold Water Siots	Warm Water	Salmonid Spenning	Primary Contact	Secondary Contact	

ID-17050121-03 Middle Fork Payette River upstream limit: Scriver Creek downstream limit: Anderson Creek Cont. PNRS: 703.80 1998 Draft §305(b) and §303(d) Information §303(d) listed: yes assessment info: DEO '96 WBA cause: sediment Idaho's Beneficial Uses: Cold Water Water Supply IDAPA 16.01.02.100 status assessment for 1998 1998 Sub-basin Assessment Information i. §303(d) listed: yes TMDL status: TMDL Developed 1998 cause: sediment Idaho's Beneficial Uses IDAPA 16.01.02.100 sub-basin assessment status Full Full Not Full Felt Fall Full Support Support Support Support Recommended Designations for Idaho Water Quality Standards idaho's Beneficial Uses IDAPA 16.01.02.100 Designated Beneficial Uses for **76**5 4:4: yes yes* ID-17050121-03:

* limit to P. williamsons ** secondary unnecessary when primary is designated

Notes: 10-17050121-03 Middle Fork Payette River

This water body includes the segment of the Middle Fork Payette River from Anderson Creek to Scriver Creek. Gooseberry Creek, Little Gooseberry Creek, Warm Springs Creek, Smith Creek, Easley Creek and Pyle Creek are tributaries. The Middle Fork Payette River is a fourth order stream and classified as a C5 Rosgen stream type. The bed and banks are dominated by sand with occasional gravel and sitt/clay. Air photos and retent flyavet of the area show that the stream is channelized compared to historic conditions. The historic channel had higher sinusity. There are still meander pools and traces of meander bends.

The lowland adjacent to this segment has been developed. The town of Crosch is located at the lower end of the segment. Most Crouch urban and numicipal facilities acquire fresh water from wells and dispose of waste water with septic systems. Much of the low lying land immediately adjacent to the Middle Fork Payette is used as pasture or wetland sinks. Roads cross the Middle Fork Payette times during the length of this water body.

This segment of the Middle Fork Payette River has not been formally monitored by DEQ. No other data was submitted by agencies when requested for data for this assessment, specific to this water body. Based on visual observations, it is estimated that the substrate consists of approximately 80% fines, with the remainder being peoble and cobble sized.

Suckers, and to a lesser extent, whitefish, are the predominate large fish species currently utilizing this segment of the Middle Fork Payette River. This segment is appropriate for and utilized by three species of native salmonid fishes, mountain whitefish (Prosopium williamsoni), redband trout (Oncorninchus mykiss), and built trout (Salvelinus confluentus). While specific fishery monitoring data do not exist for this segment, information from similar, neighboring segments, and observation show that mountain whitefish propagate in, and year round inhabit water bodies of this type and condition. Redband trout (residualized steelhead), planted rainbow trout (O. mykiss) and built trout are limited by lack of complexity to the habitat. Redband trout, and planted rainbow trout occasionally use this stream and would be more abundant year round, if habitat complexity and cover were increased. Redband/Rainbow trout have been observed using schools of suckers for cover. The most sensitive salmonid in the basin are built trout. It is essential that built trout be able to better utilize this segment for migration to the rest of the Payette built trout populations. This segment is also critical to built trout as overwintering habitat for adult and sub-adult fluvial (large

4 2 4 F

stream migrating) built trout. Built Trout has been anecdotally observed utilizing one to the few pools near Crouch. Surveys are needed to better understand these and other non-game harive fishes of the watershed.

The habitat in this segment is in a poor condition for fish. No pools, greater than 2 meters in depth, have been observed during normal base flow conditions. Fine sediment inputs exceed carrying capacity much of the year. Fine sediment (46.35 mm) dominate channel bed and banks. Gravet/boulder bars are seldom and are continuously covered by fine sediment after being exposed for short periods during low flow. Pools and to some extent riffles and glide habitats are missing. Fine sediment beds with thin veneers of water flowing over their top are predominant. The few existing pools are usually the result of hard structures that confine and accelerate water, like bridges, bank barbs or tight radius meanure bends.

As far as it is known, this water body is free of water column contamination, excepting high levels of event driven suspended sediment. It is not clear if and how this suspended sediment impairs beneficial uses. The status of the microbiota, such as bacteria and other pathogens, is unknown and may need further investigation.

Numeric criterion in Idaho's Water Quality Standards have not been exceeded by any data generated sampling this water body. The amount of bed load sediment in this segment do impair Cold Water Biota and therefor, exceed Idaho's narrative sediment criteria (IDAPA: 16.01.02.200.08.)

All water supply and regreational beneficial uses have been "full support" for at least the last five years. Salmonid Spawning beneficial use is also "full support". The all but incidental spawning native salmonid is the mountain whitefish. Mountain whitefish are broadcast spawners and apparently successful in the Middle Fork Payette River or neighboring streams. Redbard trout spawning is unlikely and built trout spawning is only going to occur much further up in the watershed. Cold Water Bjots beneficial use is impaired and is "Not Full Support". As discussed cartier cold water bints, redband trout and bull trout, find habitat quality not sufficient to utilize the area. Their use of this segment is crucial to the long term survival of both species. Using \$105(b) terminology the "cause" of the "Not Full Support" call for Cold Water Blots is excessive bed load sediment, and is emploited by a channelized stream. The "source" for excessive sediment is limited to nonpoint source activities. These activities include roads, bank failures, forest practices, agricultural practices, astural landslides and to a minor extent storm water management and direct dumping farther up in the watershed and along the tributaries.

It is important to note that loss of anadromous fish, introduction of non-native fishes, and nearby stocking of hatchery fish for a "put and take fishery" have greatly affected the complex interactions of the remaining native salmonids (S. confinentes: O. moltes, and P. villiansons). It is difficult to define or assure recovery given these other population controlling issues.

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ID-17050121-04 Midd	le Fork Paye	tte River		uit: Lightning (ar dan ing Propinsi Salah sa Dinakan salah		College Maryo Salaha
	PNRS: 703.0	0	* 11	limit: Scriver	e i veri dat skalatska til		
Current Classification in Idaho W	ater Quality	Standards					nysan aran Sanggariya Lilik
map code: SWB-322 This water t	ody is: Class	ified				Special Resour 1.02.95: yes	ce Water:
Idaho's Beneficial Uses: IDAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Biota	Selmoned Spawning	Primary Contact Recreation	Secondary Contact Recreation
Designated Beneficial Uses for this water body:	yes 	yes Vijanas si	yes	ao	yes	yes	yes
	denotes in	aplicit designati	on through IDA	PA 1601.02.10	l.01.a		de de la companya de
988 §305(b) and §303(d) Informa	tion 🔻 🌲	rackina.					sa in the
303(d) listed: no ause: daho's Beneficial Uses:	Domestic	nfo; evaluated	Cold Weter	Watte Water	Selmonid	Presery	Secondary
DAPA 16.01.02.100	Water Supply	Water Supply	Biota		Spenning	Contact Recrussion	Contact Recreation
tatus assessment for 1988	Fell Support	Full Support	Full Support		Full Support	Full Support	Fall Support
992 §305(b) and §303(d) Informat	ion		SPORTS GREAT				2 ⁶² 0 27 2 50
303(d) listed: me use:	assessment li	ofo ; not assess	ed in 1992				
laho's Beneficial Uses: DAPA 16.01.02.100	Dormestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Biota	Salmonid Spenning	Primary Contact Recrusion	Secondary Contact Recrustion
atus assessment for 1992		 	 				
94 §305(b) and §303(d) Informati	ioп		4	 -	<u> </u>	·	<u></u>
03(d) listed: yes use: sediment	assessment in Forest analys		odies assessed in	n 1994. 303(d)	listing resulter	l from Boise l	Vational
aho's Beneficial Uses: APA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Waren Water Biota	Submouted Spawning	Primary Contact Recreation	Secondary Contact Recreation
itus assessment for 1994							
96 §305(b) and §303(d) Informati 03(d) listed: yes		for no water he	dies assessed is	1004 202/-			
rso: sediment	Forest analys	is.	wes assessed it	1 1770. JUS(Q)	STREET	14.018C V	iagodāi ·
tho's Beneficial Uses: APA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Weter Biota	Salmonid Spewning	Primary Contact Recreation	Secondary Contact Recreation
tus assessment for 1996	 -						<u> </u>

1998 Draft \$305(b) and \$303(d) [nformation			it: Scriver Cri			· ·
§303(d) listed: yes cause: sediment		ib: DEQ '96 W	BA				•.7
Idaho's Beneficial Uses: IDAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	1. Oak 1	Waster Walter Blots	Spannoard Spanning	Primary Contact Recreation	Secondary Contact Recreation
Status assessment for 1998							
1998 Sub-basin Assessment Inform \$303(d) listed: yes cause: sediment.		TMDL Develo	ped 1998				>%. A.
daho's Boneficial Uses: DAPA 16.01 02.100	Description of the last of the	Agriculum Warrings			Salmonjid Communing	Primary Costact Repression	Secondary Connect Recrussion
all-bank programs done	Pall Support	11. 11. 11. 11. 11. 11. 11. 11. 11. 11.	Net Foll : Support		rall Support	Pull Support	Pall Support
Recommended Designations for Id	abo Water Qu	ality Standar	ds				
dabo's Beneficial Uses: DAPA 16.01.02.100	Discourie Street Samply			an Ven di			Secondary Contact Respectors
). EX.		- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	CONTRACTOR	ON ENGINEERS OF STREET	12-14	Control of the latest Assessment

Notes: ID-17050121-04 Middle Fork Payette River

This water body includes the segment of the Middle Fork Payette River from Scriver Creek to Lightning Creek. Koppes Creek is the only named tributary to this segment. The Middle Fork Payette River is a fourth order stream and classified as a C5 Rosgen stream type. The bed and banks are dominated by sand with occasional gravel and sile/clay. Air photos and recent flyover of the area show that the stream is channelized compared to historic conditions. The historic channel had higher sinuosity. There are still meander pools and traces of meander bends.

The lowished adjacent to this segment has been developed. The town of Crouch is located approximately five miles downstream from the confluence with Scriver Creek. Much of the low lying land immediately adjacent to the Middle Fork Payette is used as pasture or wetland sinks. Two small bridges cross the river to this segment.

This segment of the Middle Fork Payette River has not been monitored by DEQ. When requested, no other data was submitted by agencies for this assessment, specific to this water body. Additional investigations include Middle Fork Payette River TMDL Sediment Trend Monitoring (Fitzgerald et al. 2/9/98). A site was established this year at the Lightning Creek Bridge for the Middle Fork Payette River TMDL Sediment Trend Monitoring project. At this site we have begun measuring discharge, suspended sediment, turbidity, and bed load. Based on visual observations, it is estimated that the substrate consists of approximately 80% fines, with the remainder being cobble.

Suckers, and to a lesser extent, whitefish, are the predominate large fish species currently utilizing this segment of the Middle Fork Payette River. This segment is appropriate for and utilized by three species of native salmonid fishes, mountain whitefish (*Prosopium williamsomi*), redband trout (*Oncorhynchus mykiss*), and built trout (*Salvelinus confluentus*). While specific fishery monitoring data do not exist for this segment, information from similar, neighboring segments, and observation show that mountain whitefish propagate in, and year round inhabit water bodies of this type and condition. Redband trout (residualized steelhead), planted rainbow trout (*O. mykist*) and built trout are limited by lack of complexity to the habitat. Redband trout, and planted rainbow trout occasionally use this stream and would be more abundant, year round, if habitat complexity and cover were increased. Redband/Rainbow trout have been observed using schools of suckers for cover. The most sensitive salmonid in the basin are built trout. It is essential that built trout be able to better utilize this segment for migration to the rest of

the Payette bull trout populations. This segment is also critical to bull trout as overwintering habitat for adult and sub-adult fluvial (large stream migrating) bull trout. Bull Trout has been anecdotally observed utilizing one to the few pools near Crouch. Surveys are needed to better understand these and other non-game native fishes of the watershed.

The habital in this segment is in a poor condition for fish. Fine sediment inputs exceed carrying capacity much of the year. Fine sediment (\$6.35 mm) dominate channel bed and banks. Gravel/boulder bars are seldom and are continuously covered by fine sediment after being exposed for short periods during low flow. Pools and to some extent riffles and glide habitats are missing. Fine sediment beds with thin veneers of water flowing over their top are predominant. The few existing pools are usually the result of hard structures that confine and accelerate water, like bridges, bank barbs, and tight radius meander bends.

As far as it is known, this water body is free of water column contamination, excepting high levels of event driven suspended sediment. It is not clear if and how this suspended sediment impairs beneficial uses. Another area of potential concern that may require further investigation is the bacteria and associated pathogens concern. Pasture run off and septic failure may occur, and become a health risk for contact recreation and the downstream water supplies.

Numeric criterion in Idaho's Water Quality Standards have not been exceeded by any data generated sampling this water body. The amount of bed load sediment in this segment do impair Cold Water Biota though, and therefor exceed Idaho's narrative sediment criteria (IDAPA 16.01.02.200.08.)

All water supply and recreational beneficial uses have been "full support" for the last five years. Salmonid Spawning beneficial use is also "full support". The all but incidental spawning native salmonid is the mountain whitefish. Mountain whitefish are broadcast spawners and apparently successful in the Middle Fork Payette River or neighboring streams. Redband trout spawning is unlikely and built foult spawning is only going to occur much further up in the watershed. Cold Water Biots beneficial use is impaired and is "Not Full Support". As discussed earlier, cold water block, redband trout and built trout, find habitat quality not sufficient to utilize the area. Their use of this segment is crucial to the long term survival of both species. Using §305(b) terminology the "cause" of the "Not Full Support" call for Cold Water Biots is excessive bed load sediment, and is compounded by a channelized stream. The "source" for excessive sediment is limited to nonpoint source activities. These activities include roads, bank failures, forest practices, agricultural gractices, natural landslides and to a minor extent, storm water management and direct dumping.

It is important to note that loss of anadromous fish, introduction of non-native fishes, and nearby stocking of hatchery fish for a "put and take fishery" have greatly affected the complex interactions of the remaining native salmonids. It is difficult to define or assure recovery given these other population controlling issues. The fish in this segment have also had high predation by fish eating merganners and river others.

LD-17650121-85	Lightning Creek	upstream limit: headwaters		
	PNRS: Home	downstream jimir: Middle I	ork Payette River	
Current Classification in Idaho V map code: map codes not This water available for naclassified water bodies	Water Quality Standards rbody is: Unclassified		Designace Special Resou IDAPA 16.01.02.95; 10	rce Water:
Idabo's Beneficial Uses: IDAPA 16.01.02.100	Depositic Agricultural Water Supply Water Supply	Cold Water Warm Water Biots Biots	Salmonid Primary Spawning Contact Retreation	Secondary Contact Recreation
Designated Beneficial Uses for this water body:		yer no through IDAPA 1601.02.101	no g#	no
1988 §305(b) and §383(d) Inform §303(d) (and, so	Ation	AL 1988 - 1	(A),411 (A),444	
Idabo's Recellicial Uses: IDAPA 16.01.02.100	Delementar, Water Supply Agricultural Water Supply Water Supply	Cold Water - Warni Water Biota - Biota	Substantia Primary Spanning Contact Succession	Secondary Contact Reconsion
STATUS ASSESSMENT for 1988				
1992 \$305(b) and \$303(d) Informa \$303(d) listed: no conser:	ition essessment info : not essess	oci in 1992		
idelio's Reselloist Uses: IDAPA 16.01.02.100	Desirate Againstand Water Supply Water Supply	Cold Water Water Biota Biota		Secondary Contact Recruition
status assembent for 1992			1 () () () () () () () () () (
1994 §305(b) and §303(d) Informa 383(d) lissed: yes		odies assessed in 1994, 303(d)	Nating resulted from Beise	National
age: adhean dato's Beneficial Dear DAPA 16:01:02:100	Cortest associated and apply the Supply of Sup	Cald Water Water Water Blots	Salmontal Control Salmontal Lacration	Secondary Context Recreation
takin assessment for 1994				i sariya
996 §305(b) and §303(d) Informat 303(d) listed: yes mise: sediment		odici assessed in 1996. 303(q) i	isting resulted from Baine l	n e e e
dabo's Beneficial Uses: DAPA 16.01.02,100	Domestic Agricultural Water Supply	Cald Water Warm Water Biots Biots	Salmonid Primary Spawning Contact Recreation	Secondary Contact Recreation
atus assessment for 1996			January January	1 7

ID-17050121-05

Lightning Creek

upstream limit; headwaters

Na British Kales at the

1998 Draft §305(b) and §303(d) Info	rmation	See		Contraction of the second			
§303(d) listed: "no cause: delisting proposed"	assessment in	fo:					
Idaho's Beneficial Uses: IDAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Biota	Selmoned Spewaing	Primary Contact Recreation	Secondary Contact Recreation
itatus assessment for 1998		<u> </u>					
1998 Sub-basin Assessment Informa	tioa						
303(d) listed: "no ause: delisting proposed"	TMDL status	No TMDL pla	nned				
daho's Beneficial Uses; DAPA 16.01.02.100	Demante Water Supply	Agricultural Water Supply	Cold Weser Biots	Warm Water Biota	Selmond Spanning	Property Connect Recoveration	Secondary Contact Recreation
ub-basin assessment status		Full Support	Full Support		Full Support	Full Support	
Recommended Designations for Idal	o Water Qu	ality Standa	rds				
daho's Beseficial Uses: DAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Water Water Blots	Salmonid Spanning	Primery Contact Recognice	Secondary Contact Recrestion
lesignated Beneficial Uses for D-17050121-05:	3 0	yes	yes 👋	R0	yes*	уез	#0**

^{*} limit to O. mykisr ** secondary unnecessary when primary is designated

Notes: ID-17050121-5 Lightning Creek

This water body includes Lightning Creek from its headwaters to the Middle Fork Payette River. Tributaries include Onion Creek and several other small unnamed tributaries. At its confluence with the Middle Fork Payette River, Lightning Creek is a third order stream and is a B Rosgen stream type. It is an "A" type stream further up in the watershed as the terrain steepens. The bed and banks are dominated by grayet but also include boulders, cobble and sand.

The Lightning Creek watershed lies almost entirely on forest service land. It flows through private land just at the confluence with the Middle Fork Payette River. The town of Crouch is located approximately eight miles downstream from the confluence with the Middle Fork Payette River. There is also an irrigation diversion approximately 1/2 mile upstream from the confluence. Forest Service Road 611 lies within the lower Lightning Creek watershed and dead ends approximately eight road miles (four river miles) upstream from the confluence.

HE WASHINGTON THE WAY DESAM WASHINGTON

Lightning Creek has not been monitored by DEQ prior to the BURP monitoring July 11, 1996. Four sites exist on Lightning Creek.

96SWIROB48	Lightning Creek bridge		4.64 107
97SWIROA71	just upstream from MFPR confluence		5.00 65
1998SBOIA76	0.7 mile from intersection of FR611 and FR698 miles from intersection of FR611 + FR698	t may be well	NA 84°

^{* *} interim value, hand calculated, has not gone through review

SANATA MARKATANA

NA * macroinvertebrate lab analysis not available as of September 1, 1998

The MBI is a measure of aquatic insects and other macroinvertelerates. These samples are by no means definitive, but do give a good idea of the condition of the aquatic insect community, and from that, the relative status of the water quality. The collected insects were of assemblages that generally indicate good water quality. Habitat scores are developed following the habitat assessment process cited in Hayslip 1993. The three samples, MSWIROHAR, 975WIROA/1, and 19985BOIA76 are located in relatively the same apot, within 0.5 miles of the confluence with Middle Fork Payette River. The 1996 habitat assessment score falls into the category of "fall support". In between the 1996 and 1997 monitoring, the "New Years Day Flood" of 1997 occurred. The climatic event was manifested in this watershed as a significant rain on snow event. Many natural and man caused land slides occurred up in the watershed. The 1997 monitoring was conducted on the upper end of a delta like formation of transported fine sediment. The 1998 monitoring and observation suggest that this area may be in a state of recovery.

The habitat in this stream is in fair condition for fish. Gravet and boulders dominate channel bed and hanks. Pools are not frequent, making up less than 5% of the stream, with the remainder dominated by riffles, runs and gildes. Upper Lightning Creek is also considered to be "adjunct" habitat for Bull Trout. This would indicate that the elevation and watershed size is adequate for spawning and rearing in the upper watershed including Onion Creek, however, whether bull trout have ever used it for these purposes is unknown.

Boise National Forest Aquatic Survey:
Mile 0.0, 5 Sculpin, 5 Sucker
Mile 2.5, 64 Rainbow Trout (lengths unknown)
Mile 3.5, 51 Rainbow Trout (lengths unknown)

The lengths of the rainflow front are unknown, but are in relatively abundant numbers. More fishery data would be of assistance, but this abundance suggests that rainbow front are successfully reproducing (salmonid spayning).

As far as it is known, this water body is free of water column contamination, excepting high levels of event driven suspended sediment. It is not clear if and how this suspended sediment impalts beneficial uses. Lightening Creek was impacted by the rain on soow event in lanuary 1997. A considerable amount of sediment was delivered to the system and eventually to the Middle Fork Payette River. The stream gradient does not allow for significant deposition of fine sediment, however, the habitat score for the 1997 BURP monitoring indicate an impact to the riperion area. Due to a tack of development in the watershed, becterin counts should be low.

Numeric critation in Idaho's Water Quality Standards and Wasternater Treatment Requirements have not been exceeded by my data generated sampling this water body. Based on current assessment protocols and this assessment, the previously mentioned monitoring indicate this stream fully supports cold water blots, and salmonid spewaing as a beneficial uses. Domestic Water Supply, Warm Water Biots, and Secondary Contact Recreation are neither destiguated nor existing and therefore have not been assessed. Agricultural Water Supply and Primary Contact Recreation are in the "full support" category as well.

A17

ID-17050121-06	Middl		ette River	upsircaro	imu: Big Bul	ldog Creek		
		PNRS: 703		downstrea	m limit. Ligh	tning Creek		
Current Classification in	Idaho W	ster Qualit	y Standards			Life and Control	1325 . \$3	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
map code: SWB-322	This water b	ody is: Cla	ssified			Designates	l Special Reso	arce Water:
Idaho's Beneficial Uses:				1	1	1 1/2	.01.02.95: yes	
IDAPA 16.01.02.100		Operantic Water Supply	Agricultural Water Supply		Warm Wat Biota	er Salmonid Sperming	Prispary Contact Recreasion	Secondary Contact Recreation
Designated Beneficial Uses for body:	this water	yes	yes	yes 📉	190	ya	yes 🔻	Yes
		• denotes	landicit desions	tion through ID	AP4 1601 02	10103	j	
1988 §305(b) and §303(d)	Informat					- IVI.JI 4		
303(d) listed: no			info: evaluate	đ	22712	## H. S. F.		
		•			n vitt	day in		
daho's Beneficial Uses: DAPA 16.01.02.100		Domestic Water Supply	Agricultural Water Bupply	Cold Water Biota	Water Water Blants	Salmonia Speciment	Primary Contact Recognition	Secondary Contact Recognion
atus assessment for 1988		Full Support	Fail Support	Fall Support		Fall Support	Pull Support	Full
992 §305(b) and §303(d)	Informati	On				j Szepta	l orbital	Support
		ASSESSINGE	info : pot spec	sed in 1992				
USC: HEALT A TO SEE THE SEE TH	,		1					
abo's Beneficial Uses: APA 16.01.02.100	4 4 S	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Biota	Salmoned Spewning	Printery Contact	Sennodery Contact
ous assessment for 1992							Rectestive	Rosmanion
94 §305(b) and §303(d) I	nformatio	· · · · · · · · · · · · · · · · · · ·						<u>· i</u>
03(d) listed: yes use: sedlment		assessment i	afo: no water ! vis.	odies assessed	in 1994. 303	(d) listing results	d from Boise	National
ho's Beneficial Uses: APA 16.01.02.100	1	Domessie Water Supply	Agricultural Water Supply	Cold Weter Biote	Warm Water Biote	Salmonid Spenning	Primary Contact	Sucondary Contact
us assessment for 1994							Recreation	Recrustion
96 §305(b) and §303(d) In	formation	1	·	·				<u> </u>
3(d) listed: yes c: sediment	4 1	issessment in Forest analy:	fo: no water be sis.	odics assessed i	n 1996. 303(d) listing resulted	l (rom Boise N	ational
o's Beneficial Uses: PA 16.01.02.100		Contenic Vater Supply	Agricultural Water Supply	Cold Water Binta	Warm Water Biota	Selmonid Spawning	Primary Contact Recreation	Secondary Consect Recreation
is assessment for 1996			- 			+		

ID-17050121-06	🌉 Middle Fork Paye	tte River	upstream jin	ir. Big Bulldog	Creek	î.	
	PNRS: 703.0	0	downstream	Timet Lightnin	(Creek		
1998 Draft §305(b) and §	303(d) Information			aris de	M.C.	不包括的	
§303(d) listed: yes cause: sediment	assessment	mfo: DEQ '96 V	VBA			- 1414 - 1	
Idabo's Beneficial Uses: IDAPA 16.01,02,100	Connect: Water Supply	Agricultural Waar Supply	Cold Wasse Biota	Wants Water Siots	Salmonid Spending	Transmy Contact Repression	Secondary Contact Recreation
status essessment for 1998							
1998 Sub-basin Assessme	nt Informatica						
(303(d) listed; yes :ause: sediment	TMDL stany to Lightnin		oped 1998 - TI	4731, from 0.5 :	niles dewastr	eam (rom Big	Bulldog Cre
daho's Beneficial Uses: DAPA 16.01.02.100	Consent Water Barriery Consent Cons	Agriculture Water Supply of the Supply	Cold Water Blum Water of The W	Water Water Bloom No. State William To. State	Salmontel Operating	Premity Street 200	Scorodary Cartest Recoveries
ub-basio aspessment status	Full Support	Full Support	Not Pull : Support		Tell To	Pull (S): Support	Full Support
lecommended Designation	ns for Idaho Water Q	eality Stand:	irds 💛 🦠				
daho's Beneficial Lises: DAPA 16.01.02.100	Demostic Marx Supply	Agricultural Water Squark	Cold Water Birth	Warm Water Bises	Salanopid Specializa	Primery Committee Names and	Secondary Contest Restruction
Designated Beneficial Uses for D-17050121-06:		74	yes		ges*	yes.	m.
(mil to P. villianson) ** sec	andary useconsary when p	rimary is disign	uted			******	

Notes: ID-17050121-06 Middle Fork Payette River

This water body includes the segment of the Middle Fork Payette River from Lightening Creek to Big Buildog Creek. Anglebright Guich, Skid Road Creek and Tie Creek are ributaries to this segment. The Middle Fork Payette River is a fourth order stream and classified as a C5 Rosgen stream type. The majority of the hed and benick are dominated by said with occasional gravel and silvelay. Air photos and secont flyore of the area show that portions of the areas are channellized compared to historic conditions. There are still meaning pools and amount of meaning bends. Approximately 0.5 miles down stream this segment from Hig Buildog Creek changes from a sediment transport reach to a sediment depositional reach. The upper section (transport) is boulder pool deminated. This upper section is not represented by the following description.

The lowland adjacent to this segment has been developed. The town of Crossch is located approximately eight miles downstream from the confluence with Lightening Creek. Much of the low lying land immediately adjacent to the Middle Fork Payette is used as pasture or yard. The bridge for forest road \$11, crosses the river in this segment.

This segment of the Middle Fork Payette River was first monitored by DEQ on July 20, 1994. Two BURP sites exist in this segment. These sites exist at the uppermost portion of this segment in the sediment transport reach.

Site ID	Location	MEL HI
94SWIROA44	upstream from Tie Creek CG	2.61 86
95SWTROC28	@ Tie Creek CG	4.55 1 83

\$\$ -40\$ \$ 15 mil

The fish population has been surveyed by the Boise National Forest using their aquatic survey protocol. The results were no salmonids and 29 suckers. In 1978-Lyle Burmeister and Don Corley observed 2 Dolly Varden that were 14 inches or longer at their Tie Creek site. These Dolly Varden have had their common name changed from "Dolly Varden" to "Bull Trout", in any case Lyle and Don had observed fluvial built trout near Tie Creek back in 1978.

Additional investigations include Middle Fork Payette River TMDL Sediment Trend Monitoring (Fitzgerald et al. 2/9/98). A site was established this year at the Lightning Creek Bridge for the Middle Fork Payette River TMDL Sediment Trend Monitoring project. At this site we have begun measuring discharge, suspended sediment, turbidity, and bed load. Based on visual observations, it is estimated that the substrate consists of approximately 80% fines, with the remainder being cobble.

Suckers, and to a lesser extent, whitefish, are the predominate large fish species currently utilizing this segment of the Middle Fork Payette River. This segment is appropriate for and utilized by three species of native salmonid fishes, mountain whitefish (*Prosopium williamsoni*), redband trout (*Oncorhynchus mykiss*), and built trout (*Salvelinus confluentus*). While specific fishery monitoring data do not exist for this segment, information from similar, neighboring segments, and observation show that mountain whitefish propagate in, and year round inhabit water bodies of this type and condition. Redband trout (residualized steelhead), planted rainbow trout (*O. mykiss*) and built trout are timited by lack of complexity to the habitat. Redband trout, and planted rainbow trout occasionally use this stream and would be more abundant, year round, if habitat complexity and cover were increased. Redband/Rainbow trout have been observed using schools of suckers for cover. The most sensitive salmonid in the basin are built trout. It is essential that built trout be able to better utilize this segment for migration to the rest of the Payette built trout populations. This segment is also critical to built trout as overwintering habitat for adult and sub-adult fluvial (large stream migrating) built trout. Surveys are needed to better understand these and other non-game native fishes of the watershed.

The habitat in this segment is in a poor condition for fish. Fine sediment inputs exceed carrying capacity much of the year. Fine sediment dominate channel bed and banks. Gravel/boulder bars are seldom and are continuously covered by fine sediment after being exposed for short periods during low flow. Pools and to some extent riffles and glide habitats are missing. Fine sediment beds with thin veneers of water flowing over their top are predominant. The few existing pools are usually the result of hard structures that confine and accelerate water, like bridges.

As far as it is known, this water body is free of water column contamination, excepting high levels of event driven suspended sediment. It is not clear if and how this suspended sediment impairs beneficial uses. Another area of potential concern that may require further investigation is the bacteria and associated pathogens concern. Pasture and yard run off and septic failure may occur, and become a health risk for contact recreation and the downstream water supplies.

Numeric criterion in Idaho's Water Quality Standards have not been exceeded by any data generated sampling this water body. The amount of bed load sediment in this segment do impair Cold Water Biota though, and therefor exceed Idaho's narrative sediment criteria (IDAPA 16.01.02.200.08.)

All water supply and recreational beneficial uses have been "full support" for the last five years. Salmonid Spawning (P. williamsoni) beneficial use is also "full support". The all but incidental spawning salmonid native is the mountain whitefish. Mountain whitefish are broadcast spawners and apparently successful in the Middle Fork Payette River or neighboring streams. Redband trout spawning is unlikely and bull trout spawning is only going to occur much further up in the watershed. Cold Water Biota beneficial use is impaired and is "Not Full Support". As discussed earlier, cold water biota, redband trout and bull trout, find habitat quality not sufficient to utilize the area. Their use of this segment is crucial to the long term survival of both species. Using §305(b) terminology the "cause" of the "Not Full Support" call for Cold Water Biota is excessive bed load sediment, and is compounded by a channelized stream. The "source" for excessive sediment is limited to nonpoint source activities. These activities include roads, bank failures, forest practices, agricultural practices, natural landslides and to a minor extent storm water management and direct dumping.

It is important to note that loss of anadromous fish, introduction of non-native fishes, and nearby stocking of hatchery fish for a "put and take fishery" have greatly affected the complex interactions of the remaining native salmonids. It is difficult to define or assure recovery given these other population controlling issues. The fish in this segment have also had high predation by fish eating merganisers and river otters.

and the

ID-17050121-07	Big Bul	idog Creek	upstream limit:	Bulldog Creel	.	
		(S. wone	downstream Hig	it: Middle Fø	k Payette Riv	4
Current Classification	in Idaho Water (uality Stapdards			er progra	
map code: map codes not available for unclassified water bodies	This water body is	Uaclassified			Designated Sp IDAPA 16.01	ecial Resource Water. .02.95; no
Idaho's Beneficial Uses: IDAPA 16.01.02.100		entic Agricultural w Supply Water Supply	Cold Water Sipta	Warte Water Blots	Selmonid Spenning	Primary Secondary Contact Recreations Recreation
Designated Beneficial Uses (body:		no motes implicit designa	yes*	mo 1601.02.101.0	80	yes* 100
1988 §305(b) and §303(1303(d) listed: 80 8880:		sement into a set uses	ed in 1988	The state of the s		
daho's Beseffelal Uses: 💉 DAPA 16.01.02.190	Dom Wes	Apricultural Resply Water Engaly	Cold Water Ricks	Wacan Water Biota	Salocorid Spewring	Privately Secondar Contact Repression
tatus assessment for 1988						
992 §305(b) and §303(c 303(d) listed: ma		ssment info : not asses	ncel in 1992			
isho's Besoficial Uses: DAPA 16.01.02.100	Per vision	otic Agricultural Supply Water Supply		Warra Water Biota		Princey Common Contact Secretors Contact Conta
atus assessment for 1992			in. Silka			
994 §305(b) and §303(d 103(d) listed: os use:		sment info: no water t	odies assessed in 1	994.		
aho's Beneficial Uses: APA 16,01,02,190		Agricultural Supply Water Supply		/ama Waari		Printer/ Secondary Council Control Recreation Recreation
ntus assessment für 1994						
096 §305(b) and §303(d 03(d) listed: no use: sho's Beneficial Uses:	assess Dome	1 170	Cold Wass W	ama Water S		Primary Secondary
APA 16.01.02.100	West:	apply Water Supply	Biots coeffee of B			Contact Contact Recreation Recreation

A STATE OF THE STA

PNRS: none downstream limit: Middle Fork Payette River 1998 Draft §305(b) and §303(d) Information §303(d) listed: no assessment info: cause: Idaho's Beneficial Uses: Domestic Water Supply Water Supply Biota Biota Spawning Contact Recreation status assessment for 1998 1998 Sub-basin Assessment Information \$303(d) listed: no TMDL status: No TMDL planned cause:							
	PNRS: none	15. 15.	downstream	imit: Middle F	ork Payette Ri	rer	
1998 Draft §305(b) and §303(d) Ini	formation	a var	4, 4,			Mark State	
	assessment i	nfo:					
				1		Contact	Contact
status assessment for 1998				 		**************************************	
1998 Sub-basin Assessment Inform	ation		er e				
الحرف بالمسم في بن البوقي ما الما التا التا	Donnesic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Biots	Salmoted Sparating	Primary Contact Respection	Socradary Contact Recreation
sub-basin assessment status			Fuil Support	W	Full Support	Fall Sapport	यो क्रमां स
Recommended Designations for Ida	ho Water Q	uality Standa	rds				
Idaho's Beneficial Uses: IDAPA 16.01.02.100	Dornessie Water Supply	Agricultural Water Supply	Cold Water Bénta	Wares Water Biota	Salmonid Spatialing	Primary Contact Recreation	Secondary Contact Reconstion
Designated Beneficial Uses for ID-17050121-07:	te	no :	yes	80	yes*	yes	B0**
* limit to O. mykins ** secondary nunecessa	ry when primar	y is designated		este Majorje	· 		
						<u>a 128, 15, 55, 52, 51, 51,</u> 3	

Notes: ID-17050121-7 Big Bulldog Creek

This water hody includes Big Bulldog Creek from its headwaters to the Middle Fork Payette River. Tributaries include Little Bulldog Creek (to the south) and several other small unmaned tributaries. Big Bulldog Creek is a third order stream from the confluence with the Middle Fork Payette River to its confluence with Bulldog Creek and is classified as a B Rosgen stream type. The bed and banks are dominated by gravel followed by boulders, could be and sand.

The Big Bulldog Creek watershed-lies entirely within forest service land. The town of Crouch is located approximately eleven miles downstream from the confluence with the Middle Fork Payette River. Forest Service Road 61 IG dead ends approximately 1/4 mile from Big Bulldog Creek. No other roads exist in the watershed.

Big Buildog Creek was first manitored by DEQ following BURP monitoring August (1, 1993. One site exists on Big Buildog Creek.

Site ID Location MBI HI
93SWIROZZ just upstream from MFPR confluence 4.94 NA

The forest service also submitted Baseline Inventory information of Big Bulldog Creek taken September 16, 1986. They found: Small, shallow stream with a 2-3% gradient. Pool-riffle ratio is 1:8 with 3rd class pools. The substrate is 30% sand, 10% gravel, 30-35% cobble, 20% boulder and 10% bedrock. Food production is low. The sandy substrate and embeddedness is detrimental to food production, juvenile cove, winter dormancy habitat, and spawning success. DEQ evaluation of macroinvertebrate condition conflicts with above observation.

Boise National Forest Aquatic Survey Results:

Mile 0.0, 3/0-4in Rainbow Trout, 7 Sculpin, 12 Sucker Mile 7:07/0-4in 7/4-8in Rainbow Trout Mile 2.5, 1/0-4in 5/4-8in Rainbow Trout Mile 3.5, no fish

Mile 4.5, no fish

The above MBI valve is a measure of aquatic insects and other macroinvertebrates. These samples are by no means definitive but they do give us a good idea of the condition of the aquatic insect community, and from that the relative states of the water quality. The collected insects were of assemblages that generally indicate good water quality.

Although no information exists, the habitat in this stream should be in good condition for fish. Habitat measures taken in 1993 indicate

embeddedness, percent fines, campy, width to depth ratio and pool to riffle ratio are all in good condition.

As far as it is known, this water body is free of water column contamination, excepting high levels of event driven suspended sediment. It is not clear if and how this suspended sediment impairs beneficial uses. The stream gradient does not allow for significant deposition of fine sediment. Due to a lack of development in the watershed, bacteria county should be low.

Numeric criterion in idaho's Water Quality Standards and Wastewater Treatment Requirements have not been exceeded by any data generated sampling this water body. Based on current assessment protocols and observation, the monitoring indicate that this segment falls into the "full support" status category for cold water biota beneficial use. Salmonid spawning is occurring, and is in the "full support" category. Agricultural Water Supply, Domestic Water Supply, Warm Water Biota, and Secondary Contact Recreation are neither designated nor existing and therefore have not been assessed. Primary Copinci Recreation are in the "full support" category as well, even though access is not likely.

M. D. VANDALIST

Current Classification in Idaho War map code: map codes not available for unclassified water bodies Idaho's Beneficial Uses: IDAPA 16.01.02.100 Designated Beneficial Uses for this water body: 1988 §305(b) and §303(d) Informati §303(d) listed; #0 cause:	Domestic Water Supply * denotes into	Standards assified Agricultural Water Supply	Cold Water Biots yes* on through IDA	Wern Weter Bota RO	Designated IDAPA 16.0 Selmond Speeding	Special Resource 11.02.95: no Primary Contact Recrusion yes*	Secondary Context Recreation
map code: map codes not available for unclassified water bodies Idaho's Beneficial Uses: IDAPA 16.01.02.100 Designated Beneficial Uses for this water body: 1988 §305(b) and §303(d) Information (1988) [1988] [1	Domestic Water Supply denotes int On assessment	Agricultural Water Supply BO plicit designati	Cold Water Biots yes*	Biota	IDAPA 16.0 Salmonid Spearing	Primary Contact Recrustion	Secondary Contact Reconstion
available for unclassified water bodies Idaho's Beneficial Uses: IDAPA 16.01.02.100 Designated Beneficial Uses for this water body: 1988 §30%(b) and §303(d) Information (1988) §30%(d) listed; no	Domestic Water Supply Re denotes in On Assessment i	Agricultural Water Supply no aplicit designati	Cold Water Biots yes*	Biota	IDAPA 16.0 Salmonid Spearing	Primary Contact Recrustion	Secondary Contact Reconstion
Idaho's Beneficial Uses: IDAPA 16.01.02.100 Designated Beneficial Uses for this water body: 1988 §305(b) and §303(d) Information (1988) [1988] [198	* denotes in	Water Supply policit designati nfo: not assesse	yes* On through IDA	Biota	Spewring 80	Contact Recrusion	Contact Recreation
body: 1988 §305(b) and §303(d) Informati §303(d) listed: #e	denotes in	aplicit designati	on through IDA	IPA 1601.02.10		y=*	
§303(d) listed: No	Assessment i	•	ed is 1988			.	987
		1	1	~". 	· 學學 ·		ja nemina. P
idaho's Beneficial Uses: IDAPA 16.01.02.100	! ,	Water Supply	Cold Water Biota	Warm, Water Biota	Salaronid Spawning	Primary Contect Regression	Secondary Contact Recrusion
status assessment for 1988		<u> </u>	<u> </u>	†	 -		
1992 §305(b) and §303(d) Information	D n						
303(d) listed: no susse:	assessment in	nio : not assesa	ed in 1992	· ·			·
daho's Beneficial Uses; DAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Sopply	Celd Wate- Biota	Warra Water Biota	Salmonid Spewning	Primary Contact Recreation	Secondary Contact Recrusion
tatus assessment for 1992		 	<u> </u>	• • ••	 	 	
994 §305(b) and §303(d) Informatio) <u> </u>					<u> </u>	
303(d) listed: no nuse:	assessment in	ifo: no water b	odies assessed	in 1994.		v A	
iaho's Beneficial Uses: DAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Biota	Selmonid Spawning	Primery Contact Recrustion	Secondary Contact Recreation
atus assessment for 1994		 	 			* \$	
996 §305(b) and §303(d) Informatio	.		<u> </u>	*		ikis.	
303(d) listed: no use:	essessment in	fo: no water be	odies assessed i	in 1996.			
	Demestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Biota	Salmonid Spewning	Primary Contact Recreation	Secondary Contact Recreation
atus assessment for 1996			 	 			

ID-17050121-08

Big Bulldog Creek

upstream limit: headwaters

			•		,			
•	PNRS: mone	•	downstream	downstream limit: Buildog Creek				
1998 Draft §305(b) and §303(d) In	Tormation		. :		•			
§303(d) listed: no cause:	assessment is	nfo:	•					
Idaho's Beneficial Uses: IDAPA 16.01.02.100	Domesia Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Biota	Salmonid Speunlag	Primary Contact Recreation	Secondary Contact Recrusion	
status assessment for 1998				 	 	 	 -	
1998 Sub-basin Assessment Inform	ation					•	•	
§303(d) listed: no cause:	TMDL status: No TMDL planned							
Idaho's Beneficial Uses: IDAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warra Water Biota	Selmonid . Spewning	Primary Contact Recrusion	Secondary Contact Recreation	
sub-basin assessment status	·		Full Sapport			Full Support		
Recommended Designations for Ide	aho Water Q	eality Stands	rds					
Idaho's Beneficial Uses: IDAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biote	Werns Weter Biots	Salmorid Spanning	Primary Contact Recreation	Sentendary Contact Retreation	
Designated Beneficial Uses for ID-17050121-08:	no no	20	yes	10	B 0	80	yes	

Notes: ID-17050121-8 Big Buildog Creek

This water body includes Big Bulldog Creek from its confluence with Bulldog creek to it's headwaters. Tributaries include several small unnamed tributaries. Big Bulldog Creek is a second order stream at the confluence with the Bulldog Creek and is classified as a B Rosgen stream type. The bed and banks are dominated by gravel followed by boulders, cobble and sand.

The Big Bulldog Creek watershed lies entirely within forest service land. The town of Crouch is located approximately eleven miles downstream from the confluence with the Middle Fork Payette River. Forest Service Road 611G dead ends approximately 1/4 mile from Big Buildog Creek. No other roads exist in the watershed.

Big Bulldog Creek has not been monitored by DEQ following BURP monitoring.

Boise National Forest Aquatic Survey Results: Mile 5.5, no fish

Although no information exists, the habitat in this stream should be in good condition due it's remoteness and the difficulty to access.

As far as it is known, this water body is free of water column contamination. The stream gradient does not allow for significant deposition of fine sediment. Due to a lack of development in the watershed, bacteria counts should be low.

Numeric criterion in Idaho's Water Quality Standards and Wastewater Treatment Requirements have not been exceeded by any data generated sampling this water body. Based on current assessment protocols and observation, the monitoring indicate that this segment falls into the "full support" status category for cold water biota beneficial use. There is no evidence that Salmonid spawning is occurring, and therefore not assessed. Agricultural Water Supply, Domestic Water Supply, Warm Water Biota, and Secondary Contact Recreation are neither designated nor existing and therefore have not been assessed. Primary Contact Recreation is in the "full support" category as well, even though access is not likely.

ID-17050121-09	1	Buildog Cre	ek	upstream lij	nit: headwaters						
	8 1	PNRS: none		downstream limit; Big Buildog Creek							
Current Classification i	a Idaho Wa	ter Quality	Standards	1.1 21	())	v ve	i			
map code: map codes not available for unclassified water hodies	This water bo	ody is: Uncla	ssified	•	• ••.	Designated 5 IDAPA 16.0	Special Resour 1.02.95; no	ce Water:			
Idaho's Beneficial Uses: IDAPA 16,01.02.100		Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Waten Water Boots	Salmonid Spawning	Primary Contact Recommings	Secondary Contact Recreption			
Designated Beneficial Uses for body:	or this water	. 300	30	yes* «	****	ño .	yė*	B0			
	•	• denotes im	plicit designati	on through IDA	PA 1601.02.10	l.01.a.	•	991 28 3			
1988 §305(b) and §303(c	d) Informati	on	 		·		····				
§303(d) listed: ne cause:	and the second	assessment i	nio: not auteur	:d in 1988	3 (4) 7 (4) (4) 6 (4) (4) (4)	a e S	,	ng kanal			
Idaho's Beneficial Uses: IDAPA 16.01.02.108	A 1 - 4 10 1	Domestic Water Supply	Agricultural Want Shapply	Cold Water Bissts	Warm Water Biola	Salmould Spanning	Primary Contect Recognition	Secondary Contact Recreation			
status assessment for 1988			 	Care 1	TO THE PROPERTY OF	(************************************	 				
1992 §305(b) and §303(i	i) Informati	on.		\$ ₁			<u> </u>				
\$303(d) listed: no		essessment i	ofo : net essese	ed in 1992	· "	e .		ا به این			
idaho's Beneficial Uses: IDAPA 16.01.02.100		Dimentic Water Supply	Agricultural Water Supply	Cold Weter Blote	Worns Water Biots	Salmonid Spanning	Primary Contact Recreation	Secondary Contact Repression			
status assessment for 1992			1			4,573	P1.2817 3.3				
1994 §305(b) and §303(c	i) Informati	02	1 1				100				
§303(d) listed: yes suse: sediment	· T	assessment in Forest analy		adies assessed	in 1994. 303(d) listing resulte	d from Boise	National			
idaho's Beneficial Uses: DAPA 16.01.02,100		Domestic Water Supply	Agricultural Water Supply	Cold Water Biote	Warm Water Bjota	Salmenid Spanning	Primary Connect Regression	Secondary Contact Recreation			
status assessment for 1994					3	 		1			
1996 §305(b) and §303(d	l) Informati	010	 _	· <u>·</u>	•	· · · · · · · · · · · · · · · · · · ·	1 1/20 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 1 1 1 1			
303(d) listed: yes ause: sediment	a de la composición dela composición de la composición de la composición de la composición dela composición de la composición dela composición dela composición de la composición dela composición de la composición dela c	assessment is Forest analy	ulo: no water b sis.	odica assessed	in 1 996. 30 3(d)) listing resulte	d from Boise !	Vational			
daho's Beneficial Uses: DAPA 16.01.02.100	# # # # # # # # # # # # # # # # # # #	Domestic Weter Supply	Agricultural Water Supply	Cold Water Biota	Warns Water Biota	Salmonid Squeening	Primary Contact Recreation	Secondary Contact Recreation			
the look	 [* 	 					

ID-17050121-09

Buildog Creek

upstream limit: headwaters

PNRS: none

downstream limit: Big Bulldog Creek

	PNRS: none		downstream limit: Big Bulldog Creek				
1998 Draft §305(b) and §303(d)	Information						
§303(d) listed: "no cause: delisting proposed"	assessment i	nfo:					
Idaho's Beneficial Uses: IDAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Weter Blats	Warm Water Riots	Salmonid Spawning	Primary Contact Recreation	Secondary Contact Recression
status assessment for 1998		Į.					
1998 Sub-basin Assessment Info	rmation					.	
§303(d) listed: "no cause: deliating proposed"	TMDL statu	s: No TMDL P	lanned.			•	
Idaho's Beneficial Uses: IDAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Waim Water Biota	Salmonid Spawning	Primary Contact Recreation	Secondary Contact Recruetion
sub-basin assessment status			Full Support			Full Support	
Recommended Designations for	Idaho Water Q	uality Stand	ards	•			
Idaho's Beneficial Uses: IDAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biote	Warne Water Biota	Salmonid Spanning	Primary Columns Rescussion	Secondary Contest Recreation
Designated Beneficial Uses for ID-17050121-09:	= 0	10	yes	=0	20	00	yes

Notes: ID 17050121-9 Buildog Creek

This water body includes Bulldog Creek from its headwaters to the Big Bulldog Creek. Tributaries include several other small unnamed tributaries. Bulldog Creek is a second order stream at it's the confluence with the Big Bulldog Creek and is presumed to classified as a B Rosgen stream type.

The Big Bulldog Creek watershed lies entirely within forest service land. The town of Crouch is located approximately eleven miles downstream from the confluence with the Middle Fork Payette River. Forest Service Road 611G dead ends approximately 1/4 mile from Big Bulldog Creek. No other roads exist in the watershed.

DEQ crews were sent to monitor Buildog Creek August of 1997. The crew hiked for nine hours on hill slope prior to abandoning effort. Buildog creek is inaccessible, and therefore not likely to be impaired beyond natural conditions.

As far as it is known, this water body is free of water column contamination, excepting high levels of event driven suspended sediment. It is not clear if and how this suspended sediment impairs beneficial uses. The stream gradient does not allow for significant deposition of fine sediment. Due to a lack of development in the watershed, bacteria counts should be low.

Numeric criterion in Idaho's Water Quality Standards and Wastewater Treatment Requirements have not been exceeded by any data generated sampling this water body. Based on judgement that without any activities and limited access, this segment falls into the "full support" status category for cold water biota beneficial use. There is no evidence that Salmonid spawning is occurring, and therefore not assessed.

Agricultural Water Supply, Domestic Water Supply, Warm Water Biota, and Secondary Contact Recreation are neither designated nor existing and therefore have not been assessed. Primary Contact Recreation is in the "full support" category as well, even though access is not likely.

4.42

ID-17050121-10 Mi	ddle Fork Paye	tte River	upstream lix	mit: Rattlesnak	c Creek		
·	PNRS: 703.0	0	downstream	limit; Blg Ball	dog Creek		
Current Classification in Idaho	Water Quality	Standards				· · · · · · · · · · · · · · · · · · ·	
map code: SWB-322 This was	ter body is: Class	ified				Special Resour 11.02.95: yes	te Water:
Idaho's Beneficial Uses: IDAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biots	Warm Water Biota	Salmonid Spewning	Primary Contact Recreation	Secondary Contact Recrusion
Designated Beneficial Uses for this was body:	er yes	yes	Act	B O	yes	yes	70
•	denotes in	plicit designation	on through IDA	PA 1601.02.10	1.01.a.	• :	· · · · · · · · · · · · · · · · · · ·
1988 §305(b) and §303(d) Infor	nation						A STATE
§303(d) listed: no cause:	assessment i	nfo: evaluated					on de No A l e
Idaho's Beneficial Uses: IDAPA 16.01.02.100	Dementic Water Supply	Agricultural Water Supply	Cold Water Biota	Weren Water Biota	Salmonid Spewning	Primary Contact Recreation	Secondary Codeset Recreation
status assessment for 1988	Full Support	Full Support	Full Support		Full Support	Fell Support	Full Support
1992 §305(b) and §303(d) Infor	mation		<u></u>			. (1	
§303(d) listed: no cause:	assessment i	nfo : not àssess	ed in 1992		••	• • • • • • • • • • • • • • • • • • •	
Idaho's Beneficial Uses: IDAPA 16.01.02.100	Domenić Water Supply	Agricultural Water Supply	Cold Water Slices	Warm Water Blots	Salmonid Spewning	Primery Contact Recreation	Secondary Contact Recreasion
status assessment for 1992							
1994 §305(b) and §303(d) Infor	mation				·	- 	
§303(d) listed: yes cause: sediment	assessment i Forest analy		odies assessed	in 1994, 303(d) listing result	ed from Boise ?	National
Idaho's Beneficiel Uses: IDAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biots	Warm Water Biota	Selmonid Spenning	Primary Contact Recrustion	Secondary Contact Recrusion
status assessment for 1994							1
1996 §305(b) and §303(d) Inform	óstica						
§303(d) listed: yes cause: sediment	assessment in Forest analy		odies assessed	in 1996. 303(d)) listing result	ed from Boise ?	Vational
Idaho's Beneficial Uses: IDAPA 16.01.02.100	Dumestic Water Supply	Agricultural Water Supply	Cold Water Biota	Wann Water Biota	Selevorid Spewaing	Primary Contact Recrusion	Secondary Custant Recrusion
status assessment for 1996					1	 	

ID-17050121-10

Middle Fork Payette River

upstream limit: Rattlesnake Creek

PNRS: 703.00

downstream limit: Blg Bulldog Creek

formation			· · · · · · · · · · · · · · · · · · ·			
assessment in	afo: DEQ '96 W	BA		,		
Domestic . Water Supply	Agricultural Water Supply	Cold Water Biota	Water Water Biots	Submonid Spewning	Primary Contact Recreation	Secondary Contact Reseasion
nation					•	
TMDL status	: Ne TMDL pla	nued .				
Domestic Water Supply	Agricultural Water Supply	Cold Water Blots	Wann Water Biote	Salatonic Spinoralog	Primary Contact Recreation	Secondary Contact Recrusion
Full Support	Full Support	Full Support		Fall Support	Fell Support	Full Support
aho Water Qı	sality Standa	rds	****	A CONTRACTOR		
Dossessia Water Supply	Agricultural Water Supply	Cold Water Bloca	Warra Water Histo	Submunid Spanning	Primary Contact Becombine	Secretary Contest Recruition
16	16	yes	B 0	yes*	yes	10**
onder unnecess	ary when nelend	r is designated	7-22-1-22-2-22-2-22-2 I		احبت ثانات	· :
	Domestic Water Supply nation TMDL status Domestic Water Supply Full Support laho Water Qu Domestin Water Supply no	Domestic Water Supply Domestic Water Supply TMDL status: No TMDL pla Domestic Water Supply Full Support Support Support Agricultural Water Supply Full Support Support Support Agricultural Water Supply The Support The Support	Domestic Water Supply Riota Tation TMDL status: No TMDL planned Domestic Water Supply Riota TMDL status: No TMDL planned Cold Water Water Supply Riota Full Support Support Support Rho Water Quality Standards Domestic Water Supply Riota Agricultural Support Support Support Rho Water Quality Standards Domestic Water Supply Riota Water Supply Riota Bo Bo yes	Domestic Water Supply Riota Water Water Supply Riota Water Supply Riota Biota TMDL status: No TMDL planted Domestic Water Supply Riota Water Water Supply Riota Water Water Supply Riota Water Water Supply Riota Water Water Water Supply Riota Riota Biota Support Support Support Support Support Support Support Support Water Water Water Water Water Water Supply Riota Riota Riota Water Water Water Riota Riot	Domestic Water Supply Riota Water Supply Riota Spanning TADL status: No TADL planned Domestic Water Supply Riota Water Supply Riota Spanning TADL status: No TADL planned Domestic Water Supply Riota Water Statutouid Spinowing Full Full Support Support Support Support Rho Water Quality Standards Domestic Rho Water Rhota Rhota Rhota Rhota Spinowing Rho Water Supply Rhota Rhota Rhota Spinowing	Domestic Water Supply Water Supply Biota Water Biota Spanning Contact Recreation TMDL status: No TMDL planted Domestic Water Supply Blota Water Biota Spanning Contact Recreation TMDL status: No TMDL planted Domestic Water Supply Water Supply Blota Biota Spanning Contact Recreation Full Full Full Support Blota Biota Spanning Contact Recreation Agricultural Value Full Support

Notes: ID-17050121-10 Middle Fork Payette River

This water body includes the segment of the Middle Fork Payette River from Big Bulldog Creek to Rattlesnake Creek. Powderhouse Gulch, Boom Creek, Bell Creek and Rocky Carryon are tributaries to this segment. The Middle Fork Payette River is a fourth order stream and classified as a C5 Rosgen stream type. The bed and banks are dominated by sand with occasional gravel and silt/clay. This segment marks the beginning of carryon morphology for the Middle Fork Payette River.

This segment of the Middle Fork Payette River lies entirely within the Boise National Forest. The town of Crouch is located approximately 11 miles downstream from the confluence with the Big Buildag Creek. Hardscrabble and Rattlesnake forest campgrounds are located along this segment of the river. Forest service road 698 parallels and crosses the river once near Hardscrabble campground. There are no other roads located near the Middle Fork Payette in this segment.

This segment of the Middle Fork Payette River was first monitored by DEQ following BURP on August 21, 1997. One site exists in this segment. The site was picked in a depositional stretch above some rapids, and is atypical of this segment. Habitat acore is low but is representative of a very small portion of the waterhody.

Site ID 97SWIROA74 Location

just downstream from Rocky Canyon

MBI

HI 54

The fish population has been surveyed by the Boise National Forest (1993) using their aquatic survey database. The results were a reduced rainbow trout population with suckers as the predominant species. Additional surveys by the Department of Fish & Game on July 25, 1996 found the following:

EXCESSOR HARDETY SUT	WHERE M	in Whitefish

2.3 miles u.s. from Tie Creek CG	1	0	29	0
2.5 miles u.s. from Tie Creek CG	0	3	23	0
4.7 miles u.s. from Tie Creek CG	1	18	70	1

BURP monitoring found the stream bed to be predominantly sand followed by gravel and some boulders.

This segment of the Middle Fork Payette River is currently appropriate for and utilized by three species of native salmonid fishes, mountain whitefish (*Prosophum williamsoni*), redband trout (*Oncorhynchus mykiss*), and bull trout (*Salvelinus confluentus*). Mountain whitefish is the predominate utilization species for this segment. This segment is also critical to bull trout as overwintering habitat for adult and sub-adult fluvial (large stream migrating) bull trout.

The habitat in the transport sections of this segment is in a fair condition for fish. In the depositional sections (few) fine sediment inputs exceed carrying capacity much of the year. Pools and to some extent riffles and glide habitats are missing.

As far as it is known, this water body is free of water column contamination, excepting high levels of event driven suspended sediment. It is not clear if and how this suspended sediment impairs beneficial uses. Due to a lack of development in the watershed, bacteria counts should be low.

Numeric criterion in *Idaho's Water Quality Standards* have not been exceeded by any data generated sampling this water body. Based on current assessment protocols, considering the number and age classes of fish found in the IDFG survey, the amount of bed load sediment in this segment does not appear to impair Cold Water Biota as a beneficial use.

All water supply and recreational beneficial uses have been "full support" for the last five years. Salmonid Spawning beneficial use is also "full support". Both native mountain whitefish and redband trout spawn in this section. Both Mountain whitefish (broadcast spawners) and Redband Trout (redd builders) are successful in this section of the Middle Fork Payette River or neighboring streams. Bull trout spawning is only going to occur much further up in the watershed.

It is important to note that loss of anadromous fish, introduction of non-native fishes, and nearby stocking of hatchery fish for a "put and take fishery" have greatly affected the complex interactions of the remaining native salmonids. It is difficult to define or assure recovery given these other population controlling issues.



ID-17050121-11	R	attlesnake C	reek	upstream litr	iit: beadwaters		R. Och v	٠.
	7	PNRS: none	9.58	downstream	limit: Middle F	ork Payette Ri	ija ver Variasias 1980 S	Granda
Current Classification	in Idaho W	ter Quality	Standards	3.3	信仰 初期	er akarak er	MACOUNT	MAR.
map code: map codes not available for unclassified	This water b	ody is: Uncl	essified		^	Designated S IDAPA 16.0	Special Resource 1.02,95: no	e Water:
water bodies	(# <u>\$</u>		4	1	1	40 - 20 5 5		1
Idaho's Beneficial Uses: IDAPA 16.01.02.100		Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Biota	Salmonid Spawning	Primary Contact Reconstion	Secondary Contact Recreation
Designated Beneficial Uses	for this water	#0 ³	80 · Sec. 3	yes* '**	no	B0	yes*	DO DO
body:		1 3 3	1		# N	1		1
18 TO 188 SEP		• denotes im	plicit designati	on through iDA	PA 1601.02.101	.01.a	<u>r dispropiasi</u>	A.m.
988 §305(b) and §303	(d) Informat	ion						84. př
303(d) listed: no	*** *** **	assessment i	nio: not assess	ed in 1988			45,769,7°	Target 1
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daho's Beneficial Uses: DAPA 16.01.02.100		Domestic Water Sepaly	Agricultural Water Supply	Cold Water Biota	Warm Weter Biota	Selmonid Spawning	Primary Contact	Secondary Contact
tatus assessment for 1988		}		 	 	<u> </u>	Recrusion	Recrustico
992 §305(b) and §303(d) Informat	ion *	1	i dan ing sake	, we first the second			
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laho's Beneficial Uses: DAPA 16.01.02.100		Decembe Water Supply	Agricultural Water Supply	Cold Water Blots	Waren Wester Bioto	Salestrid Spenning	Princey Contact Recounting	Secondary Contact Recruscop
atus assessment for 1992				 				
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use:		. # W	te ve te.	Parcy assessor (1334	and the second	y de la companya de l	
nho's Beneficial Uses: APA 16,01.02.100	#* - \${	Domesia Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Biota	Salmonid Spawning	Primary Contact Recretion	Secondary Contact Recreation
itus assessment for 1994								
96 §305(b) and §303(d) Informatic	HD (4) 7 7 7	4:				Approximately the	.
03(d) listed: no ise:		assessment inf	b: no water b o	dies assessed in	1778.		•	
ho's Beneficial Uses: APA 16.01.02.100		Demestic Water Supply	Agricultura: Water Supply	Cold Water ** Biote	Warm Water Diom	Salmonid Spawning	Primary Contact Recreation	Secondary Contact Recreation
tus assessment for 1996	1 1 1 1 1 1							

ID-17050121-11

"Rattlesnake Creek

upstream limit; bendwaters

1998 Draft §305(b) and §303(d) Info	rmation			, - X - X - X - X - X - X - X - X - X -	deirinis.	di ata Jakin	
§303(d) listed; no cause:	essessment inf	4 0: 11					
Idaho's Beneficial Uses: IDAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Diota	Selmonid Spawning	Primery Contact Recreption	Secondary Contact Recression
status assessment for 1998	· Marie						1 2
1998 Sub-basia Assessment Informa	tion	i de la compania del compania del compania de la compania del compania del compania de la compania del compania					
303(d) listed: mo :=use:	TMDL stanus:	No TMDL, pla	aned				
daho's Beneficial Uses; DAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Waser Biota	Salmonid Spawning	Primary Contact Recreation	Secretary Contact Recreation
ub-basin assersment status			Full Support		Not Assessed	Full Support	
Recommended Designations for Idah	o Water Qu	lity Standa	rds				tay to the
daho's Beneficial Uses: DAPA 16.01.02.100		Agricultural Water Supply	Cold Water Biota	Warm Wass Biota	Salanorad Spawaing	Primary Contact Recommen	Secondary Connect Responsion
Designated Beneficial Uses for D-17050121-11:	80	96	yes	80	yes*	yes	Bo**

Notes: ID-17050121-11 Rattlesnake Creck

This water body includes Rattlesnake Creek from its headwaters to the Middle Fork Payette River. There are several unnamed tributaries to the main stem of Rattlesnake Creek. Rattlesnake Creek is a third order stream near it's confluence with the Middle Fork Payette River and is classified as a B Rosgen stream type. The bed and banks are dominated by couble followed by gravel, boulders and sand.

Rattlesnake Creek lies entirely within the Boise National Forest. The town of Crouch is located approximately 17 miles downstream from the confluence with the Middle Fork Payette River. Rattlesnake forest campground is located at the mouth of the creek. There are no roads located in the watershed.

Rattlemake Creck has not been monitored by DEQ.

The Boise National Forest Land and Resource Management Plan gives Rattlesnake Creek a Class 3 Riparian Value Class. This indicates "locally significant resource values, local sport fishery and provides a typical recreation setting or experience."

As far as it is known, this water body is free of water column contamination. The stream gradient does not allow for significant deposition of fine sediment. Due to a lack of development in the watershed, bacteria counts should be low.

Numeric criterion in Idaho's Water Quality Standards and Waserwater Treatment Requirements have not been exceeded by any data generated sampling this water body. Based on current assessment protocols, observation, and judgement this segment fall into the "full support" status category for cold water biota beneficial use. Salmonid spawning is most likely occurring, but without data has not been assessed. Agricultural Water Supply, Domestic Water Supply, Warm Water Biota, and Secondary Contact Recreation are neither designated nor existing and therefore have not been assessed. Primary Contact Recreation are in the "full support" category as well, even though access is limited.

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ID-17050121-12	Middle	Fork Payeti	e River	opstream limit	Silver Creek			
	77.47.20	PNRS: 703.00		downstream li	mit: Rattlesnal	te Creek		164
Current Classification is	n Idaho Wat	er Quality S	tandards			o Val idados		
map code: SWB-322	This water box	ly is: Classi	fied			Designated SpiDAPA 16.01	pecial Resource	Water:
		Domestic	Agricultural	Cold Water	Warm Water	Salmonid	Name of the last o	Secondary
Idaho's Beneficial Uses: IDAPA 16.01.02,100		Water Supply	Water Supply	Biote	Sicta .	Spawning	Contact Recrusion	Contact Recreation
Designated Beneficial Uses fo	r this water	yea	yes »	усь	ДО	yea	ye	yes
body:		• denotes ins	l Licit designati	on through IDAP	A 1601 02 101	01 a		•
1988 §305(b) and §303(d	l) Informatio	or 125 200 or November 2						
§303(d) listed; ≅o			ifo: evaluated					
Causer 1997 A Paragraph		dana.	an Sala				ENVIRON	1
Idebo's Beneficial Uses: IDAPA 16.01.02_100		Domento Water Supply	Agricultural Water Supply	Cold Water Block	Plana Water Block	Setmond Separating	Princery Contact Recreation	Secondary Contact Recreation
status assessment for 1988		Full	Full	Full		Pell	Full	Fett
		Support	Support	Sepport		Support	Support	Support
1992 §3 05 (b) and §303(d) Informatic							
\$303(d) listed: no cause:		assessment in	io ; apt assess	ed in 1992				
idaho's Beneficial Uses:		December 1	Agricultural	Cold Water	Wain Water	Saluncatio	Primary .	Secondary
IDAPA 16:01:02,100		Water Supply	Ware Supply	Biota	Biotu	Spenning	Counset Recreation	Contact Recreation
status acsessment (or 1992				**************************************				
1994 §305(b) and §303(d) Informatio	0						
303(d) listed: yes :ause: sediment		essessment in Forest analys	. 15. m # 5	odies assessed in	1994. 303(d) i	isting resulted	from Boise N	ntional
daho's Beschess Uses		O-1-1-1	Agricituri	Cold Water	Water Water	Salmonid .	Passacy	Secondary
DAPA 16.01.02.100		Water Sumply	Water Supply	Sipm	Biota	Spatianing	Contrata Reservation	Contact Recreation
tatus assessment for 1994					· · · · · · · · · · · · · · · · · · ·			
996 §305(b) and §303(d)	informatio				<u>.</u>		100	
303(d) listed: yes ause: sediment		assessment lof Forest analysi		dies assessed in	1996. 303(d) li	sting resulted	from Boise Na	tional
daho's Beneficial Uses:		Domestic	Agricultural	Cold Water	Warm Water	Salanonad	Printery	Secondary
DAPA 16.01.02.100		Water Supply	Water Supply			Sperorung	Contact Recreation	Contact Recreation
atus assessment for 1996		KAPA						

ID-17050121-12

Middle Fork Payette River

upstream limit: Silver Creek

PNRS: 703.00)	downstream limit: Rattlesnake Creek					
formation							
assessment i	nfo: DEQ 196 V				·		
Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water 5 Biota	Salmonid Spawning	Primary Consect Recreation	Secondary Contact Recreation	
nation	7						
TMDL status	s: No TMDL pl	anned		2		* = - : : : : :	
Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warte Water Biota	Salmonid Spawning	Primary Contact Recression	Secondary Contact Recreation	
Full Support	Full Support	Fail Support		Fuli Support	Full Support	Full Support	
aho Water Q	uality Stand	ards		<u>-</u>			
Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Biota	Sulmonid Spawning	Primary Contact Recreation	Secondary Contact Recreation	
BO	yes	yes	m o	yes*	yes	BO**	
	Domestic Water Supply TMDL statu Domestic Water Supply Full Support aho Water Q Domestic Water Supply	Domenic Agricultural Water Supply Domenic Water Supply Mater Supply Domenic Agricultural Water Supply Domenic Water Supply Full Full Support Support Support Domestic Water Quality Stand: Domestic Agricultural Water Supply	assessment info: DEQ '96 WBA Domestic Water Supply Water Supply Biota TMDL status: No TMDL planned Domestic Water Supply Water Supply Biota Full Support Support Support aho Water Quality Standards Domestic Water Supply Rota Agricultural Water Supply Biota Cold Water Biota Cold Water Biota Cold Water Biota Cold Water Biota Domestic Water Support Support Biota Cold Water Biota Domestic Water Supply Rota Domestic Water Supply Rota	assessment info: DEQ '96 WBA Domestic Water Supply Water Supply Biota Water Biota TMDL status: No TMDL planned Domestic Water Supply Water Supply Biota Water Biota Full Support Support Support aho Water Quality Standards Domestic Water Supply Rota Biota Water Biota Full Support Support Support Agricultural Water Supply Biota Biota Biota	Agricultural Cold Water Warm Water Salmonid Spawning TMDL status: No TMDL planned Donnestic Water Supply Water Supply Biota Warte Water Salmonid Spawning Full Full Support Support Support Donnestic Water Supply Water Supply Biota Biota Spawning Full Support Support Support Support Donnestic Water Supply Biota Biota Spawning Full Support Support Support Support Support Donnestic Support Support Support Support Support Donnestic Water Quality Standards Donnestic Water Supply Biota Biota Spawning	Domestic Water Supply Water Supply Biota Water Biota Salmonid Primary Contact Recreation TMDL status: No TMDL planned Domestic Water Supply Water Supply Biota Water Biota Spawning Contact Recreation TMDL status: No TMDL planned Domestic Water Supply Water Supply Biota Biota Spawning Contact Recreation Full Full Full Support Sup	

Notes: ID-17050121-12 Middle Fork Payette River

This water body includes the segment of the Middle Fork Payette River from Rattlesnake Creek to Silver Creek. Trail Creek and Six-Mile Creek are also tributaries included in this waterbody. The Middle Fork Payette River is a fourth order stream and classified as a C2 Rosgen stream type. The bed and banks are dominated by boulder with occasional gravel and sand. This segment is a continuation of canyon morphology for the Middle Fork Payette River.

This segment of the Middle Fork Payette River lies entirely within the Boise National Forest. The town of Crouch is located approximately 17 miles downstream from the confluence with the Raniesnake Creek. Trail Creek forest campground is located along this segment of the river. Forest service road 698 parallels the river and forest service road 670 forms a "T" across the Middle Fork Payette River from Silver Creek. Forest road 671 begins at the mouth of Trail Creek.

This segment of the Middle Fork Payette River was first monitored by DEQ on July 20, 1994. Two sites exist in this segment.

Site ID	Location		MBI	Н
94SWIROA43	just upstream from Rattlesnake CG		4.99	72
95SWIROC27	0.9 miles above Rattiesnake CG	3.85	90	

The fish population has been surveyed by the Boise National Forest (1993) using their aquatic survey database. The results were as follows: Mile 19.5, 1/4-8in Rainbow Trout, 1/0-4in 1/4-8in Whitefish; Mile 20.5, 1/0-4in Rainbow Trout, 1/0-4in Whitefish.

BURP monitoring found the stream bed to be predominantly cobble followed by small boulders and sand.

This segment of the Middle Fork Payette River is currently appropriate for and utilized by three species of native salmonid fishes, Whitefish (P. williamsoni), redband trout (Oncorhynchus mykiss), and bull trout (Salvelinus confluentus). Redband trout use this stream and may be more abundant, year round, if habitat complexity increased. It is essential that Bull trout be able to better utilize this segment for migration to the

rest of the Payette bull trout populations. This segment may also be critical to bull trout as overwintering habitat for adult and sub-adult fluvial (large stream migrating) bull trout.

Based on the BURP monitoring, the labited in this segment is in a law condition for Buk. Riffle habitat dominates this segment of the river, followed by runs and glides. Pools are minor or missing.

As far as it is known, this water body is free of water column contamination, excepting high levels of event driven suspended sediment. It is not clear if and how this suspended sediment impairs beneficial uses. Due to a lack of development in the watershed, becteria counts should be low.

Numeric criterion in Idaho's Water Quality Standards have not been exceeded by any data generated sampling this water body. Both macroinvertebrate and one of the habitat values show non impairment, based on current assessment protocols. Considering the number and age classes of fish found in the BNF survey, the amount of bed load sediment in this segment does not appear to impair Cold Water Biota as a beneficial use.

All water supply and recreational beneficial uses have been "full support" for the last five years. Salmonid Spawning beneficial use is also "full support". Both native mountain whitefish and redband trout spawn in this section. Both Mountain whitefish (broadcast spawners) and Redband Trout (redd builders) are successful in this section of the Middle Pork Payette River or neighboring streams. Bull trout spawning is only going to occur further up in the statershed.

It is important to note that loss of anadromous fish, introduction of non-native fishes, and nearby stocking of hatchery fish for a "put and take fishery" have greatly affected the complex interactions of the remaining entire salmonids. It is difficult to define or assure recovery given these other complation controlling issues:

Designated Beneficial Uses for this water no no no yes* no no no no no yes* no no no no no yes* no	Current Classification in Idaho V	ater Quality S	tandards					171
DAPA 16.01.02.100 Weer Supply	available for unclassified	body is: Uncla	bilie					Water:
Designated Beneficial Uses for this water no no yes* no no no yes* no body: "denotes implicit designation through IDAPA (601.02.101.01.a.) 1988 §305(b) and §303(d) Information \$303(d) Hand: no parameter info: not suspensed in 1985 *** John September Joh	[PADA 16 01 07 100	Water Supply		29/09/09/1	9 V	. 27 28 26 27 39 4000 4000	Contact	Secondary Contact Recreation
cause: Columnic Document Document Agricultural Cold Water Samurate Privary Second Record	body:						ye*	MO gas
Code	1988 §305(b) and §303(d) Informs	itio <u>a</u>						
DAPA 16.01.02.100 Water Supply Water Supply Blora Blora Spaineling Contains Recording	· · · · · · · · · · · · · · · · · · ·	· Mactement in	fo: not uneesse	d in 1988 *** %	1972 (See D. A. State See			
992 §305(b) and §303(d) Information 303(d) listed: no assessment info: not assessed in 1992 asse: Saho's Beneficial Uses: Domestic Water Supply Water Supply Blots Bl							Contract	Secondary Contact Recreation
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994 \$305(b) and \$303(d) Information 303(d) listed: no assessment info: no water bodies assessed in 1994. Inho's Beneficial Uses: DAPA 16.01.02.100 Water Supply Water Supply Riota Biota Segmentary Contact Recrumion Recrum 103(d) listed: no assessment for 1994 996 \$305(b) and \$303(d) Information 103(d) listed: no assessment info: no water bodies assessed in 1996. 103(d) listed: no assessment info: no water bodies assessed in 1996. 103(d) listed: no assessment info: no water bodies assessed in 1996.					110.07		Contact	Secondary Contact Recreation
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	DAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Waren Water Biota	Selmonid Sparraing	Contact	Secondary Contact Recreation

upstream limit: Peace Creek Silver Creek 🧎 ID-17050121-13 PNRS: none downstream limit: Middle Fork Payette River 1998 Draft \$305(b) and \$303(d) Information \$303(d) listed: "no." assessment info: cause: delisting proposed" e rang Idaho's Beneficial Uses: IDAPA 16.01.02.100 status assessment for 1998 1998 Sub-basia Assessment Information §303(d) listed: "no TMDL status: No TMDL planned cause: delisting proposed" Idaho's Beneficial Uses: IDAPA 16.01.02.100 sub-basin asse Marine Studies Fell Full Fatt Support Support Support Recommended Designations for Idaho Water Quality Standards Idaho's Beneficial Uses: Cold Water Water Wa Water Sample IDAPA 16.01.02.100 Biots Biota Comb Record Designated Beneficial Uses for B0** 80 yes 80 YC3* Yes ID-17050121-13: * limit to O mykiss and S. confluentus ** secondary unnecessary when primary is designated Notes: ID-17050121-13 Silver Creek

This water body includes Silver Creek from its confluence with the Middle Fork Payette River to the confluence with Peace Creek. There are several unmanded tributaries to the main stem of Silver Creek. Silver Creek is a third order stream from the confluence with the Middle Fork Payette River to its hendwaters and is classified as a B3 Rosgen stream type. The channel bed is dominated by cobbie sized materials and characterized by a series of rapids with irregularly spaced scour pads.

The Silver Creek watershed fies almost entirely within forest service land. Silver Creek Plunge, a privately owned recreation area, is located on a section of state fand (T12N, RAE, Section 36) on Silver Creek approximately one mile downstream from the confluence with Peace Creek. The town of Crouch is located approximately twenty miles downstream from the confinence with the Middle Fork Payette River. Forest Service Road 671 stiters this watershed approximately one mile east of the confluence with the Middle Fork Payette River. This road crosses (and begins to parallel) Silver Creek approximately two miles downstream from the confinence with Peace Creek.

Lower Silver Creek was first monitored by DEQ following BURP monitoring process August 20, 1997.

Site ID Location MBI @ the mouth 97SWIROA72 5.25

The fish population was surveyed on July 24, 1996 by the Department of Fish & Game. The results were two age classes of wild rainbow trout (17 fish) and 7 Brook Trout.

Boise National Forest Aquatic Surveys have found:

1993, Mile 6, 40-4h 1/8-12in Rainbow Trout, 3/0-4in 1/4-8in Brook Trout

1994, Mile 0, 3/0-4in 1/8-12in Rainbow Trout, 1/4-8in Whitefish

1994, Mile 3, 3/0-4in 1/8-12in Rainbow Trout, 2/4-8in Brook Trout

1994, Mile 4, 3/0-4in 1/8-12in Rainbow Trout, 1/0-4in 1/4-8in Brook Trout

Aquatic insects and other macroinvertebrates also inhabit this segment. The sample is by no means definitive but it does give us a good idea of the condition of the aquatic insect community, and from that the relative status of the water quality. The collected insects were of an assemblage that generally indicates good water quality.

The habitat in this stream is in fair condition for fish. Cobble (64-256 mm) dominate channel bed and banks. Gravel/boulder bars are frequent. This transect was dominated by riffles, and no pools were found during this BURP monitoring. Following the BURP monitoring process a pool isn't counted unless it is at least half of the stream width. Silver Creek in this section is made up of many smaller pocket/boulder pools. Habitat is available and looks good, even though it doesn't show up in the DEQ habitat score. Streambanks were in stable condition.

As far as it is known, this water body is free of water column contamination, excepting high levels of event driven suspended sediment. It is not clear if and how this suspended sediment impairs beneficial uses. The stream gradient does not allow for significant deposition of fine sediment, and the habitat score for the 1997 BURP monitoring indicate a riparian area in fair condition. Due to a lack of development in the upper reaches of the stream, bacteria counts should be low.

Numeric criterion in Idaho's Water Quality Standards and Wastewater Treatment Requirements have not been exceeded by any data generated sampling this water body. Based on current assessment protocols, observation, and judgement, this segment fall into the "full support" status category for cold water biota beneficial use. Salmonid spawning is occurring and is also in the "full support" status category. Agricultural Water Supply, Domestic Water Supply, Warm Water Biota, and Secondary Contact Recreation are neither designated nor existing and therefore have not been assessed. Primary Contact Recreation are in the "full support" category as well.

ID-17650121-14	Peace Creek	upstream limit: tre	advaters	
	PNRS: nane	downstream limit		
Current Classification in Id	aho Water Quality Stand	ards *** *** ***	Line or garding the spring of	New York
map code: map codes not This available for unclassified water bodies	s water hody is: Unclassified		Designated Spe IDAPA 16.01.0	cial Resource Water: 2.95: 00
Idaho's Beneficial Uses: IDAPA 16.01.02.100		collural Cold Water We or Supply Blots Sic	th Sprening	Printery Secondary Contact Contact Recreation Recreation
Designated Beneficial Uses for this body:		yes* no		75.7 110
1 988 §305(b) and §303(d) In	Cormation .			
§303(d) lissed: sie	ASSESSMENT INTO: NO	assessed in 1988		
Idabo's Repeticial User: IDAPA 16.01.02.100	新海(1997年) 1997年 - 19	ultural Cald Water Water Stapply Block Block		Transity Contact Conta
status assessment for 1988				
1992 §385(b) and §303(d) fai 5303(d) listed: no :nase:	ormation assessment info : se	l assessed in 1992		
daho's Beneficial Lises: DAPA 16,01,62,100		therei Cold Water War Septity Stote Stote	Specialized C	Secondary Contact Contact Contact Contact
tatus assesament for 1992				
994 §305(b) and §303(d) Info	Prosition.			
303(d) listed: no muse:	assessment info: no s	vater bodies assessed in 199	. 	
laho's Beneficial Uses: DAPA 16.01,02.100	Demostic Weer Supply Water S	Cold Water States Lupity Signs Biota	Separate C	Succeeding Succeeding officer Contact Contact Recreation
atus assessment for 1994				
996 §305(b) and §303(d) Info 103(d) listed: no use:		ater bodies assessed in 1996		
aho's Beneficial Uses: APA 16.01.02.100	Domantic Agricult Water Supply Water St		Spewning Co	mary Secondary stac: Contact promise Recreation
itus assessment for 1996			 	

ID-1	705	01	21	-14
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			. A.	L-1.

upstream limit; headwaters

10-1/030121-14	Teace Creek		大学(株)、主人特別	Signa .	Table of the control		?
	PNRS: none		downstream l	imit: Silver Cr	eck ()		
998 Draft §305(b) and §303(d) Inf	ormation 🖔						
§303(d) listed: no cause:	assessment in	ifo:					
daho's Beneficial Uses: DAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Biota	Salmonid Spewning	Primary Contact Recrussion	Secondary Contact Recreation
status assessment for 1998	 				- 11		e gin en
1998 Sub-basin Assessment Informs	ation						
§303(d) listed: no cause:	TMOL status	No TMDL PL	npaed				e de la companya de La companya de la co
daho's Beneficial Uses: DAPA 16.01.02.100	Domeștic Water Supply	Agricultural Water Supply	Cold Water Biote	Warns Water Biota	Salmound Spawning	Primery Contact Recrusion	Secondar Contact Recreation
aub-basin assessment status	Ne wo		Fuil Support		Full Support	Full Support	.X.
Recommended Designations for Ida	ho Water Qu	iality Standa	rds			e Sylves e u skryfe	
daho's Beneficial Uses:	Domestic Water Supply	Agricultural Water Supply	Colé Water Biots	Warra Water Biota	Salamonid Spanning	Primary Contact Recreation	Secondary Contact Recreation
DAPA 16.01.02.100		1					**

Notes: ID-17050121-14 Peace Creek

This water body includes Peace Creek from its headwaters to the confluence with Silver Creek. Valley Creek is a tributary to the main stem of Peace Creek along with several unnamed tributaries. Peace Creek is a third order stream from the confluence with Silver Creek to its headwaters and is classified as a B3 Rosgen stream type near it's mouth.

The Peace Creek watershed lies entirely within forest service land. There are no roads in the watershed,

Peace Creek has not been monitored by DEQ. The following is the fish data provided by Boise National Forest:

	~ (2006) (% (22%) * a.c.	A STORY OF THE			
ID	DATE ***	A B	C	e D	E F
94PEC0	08	5 9	Ì	7	11 💆 1
94PEC1	118 - 138 - 153 - 153 - 154 - 155	5 6	0	. 2	7 0
94PEC2	TIE	0 0	O	O	8 0
94PEC3	P4	4 . 0	Ð	0	0 0
93PEC0	7/28/93	2 0	0	9	2 0
93PEC1	7/28/93	2 0	0	4	0 0
93PEC2	7/28/93	0 0	Ō	O	0 0
95PEC1	8/24/95	16 10	0	7	10 0

A=Rainbow Trout 0-4in

B= Rainbow Trout 4-8in

C= Rainbow Trout &-12in

D= Brook Trout 0-4in

E + Brook Trout 4-8in

F = Brook Trout 8-12in

The habitat in this stream is in good condition for fish. Peace Creek is also considered to be "adjunct habitat" for bull trout. This would indicate that there is suitable habitat for spawning and rearing, however, whether it is used for these purposes is unknown. This watershed is affected by barriers and sediment tied primarily to dispersed recreation. In addition, brook trout occur within the watershed. Opportunities exist to remove brook trout, improve the dispersed recreation and return built trout to remove brook trout, improve the dispersed recreation and return built trout to remove the dispersed recreation and return built trout to remove the dispersed recreation and return built trout to remove the dispersed recreation and return built trout to remove the dispersed recreation and return built trout to remove the dispersed recreation and return built trout to remove the dispersed recreation and return built trout to remove the dispersed recreation and return built trout to remove the dispersed recreation and return built trout to remove the dispersed recreation.

As far as it is known, this water body is free of water column contamination, excepting high levels of event driven suspended sediment. It is not clear if and how this suspended sediment impairs beneficial uses. The stream gradient does not allow for significant deposition of fine sediment. Due to a tack of development in the watershed, bacteria counts should be low.

<u>Numeric</u> criterion in *Idaho's Water Quality Standards and Wastewater Treatment Requirements* have not been exceeded by any data generated sampling this water body. Based on current assessment protocols, observation, and judgement, this segment fall into the "full support" status category for cold water biota beneficial use. Salmonid spawning is occurring and is also in the "full support" status category. Agricultural Water Supply, Domestic Water Supply, Warm Water Biota, and Secondary Contact Recreation are neither designated nor existing and therefore have not been assessed. Primary Contact Recreation are in the "full support" category as well.

ID-17058121-15	Silver Cree	ek 💮	upstream in	mit: headwaters			for your
	PNRS: non		downstream	ı limit: Peace C	reek		
Current Classification in Idah	o Water Quality	Standards			in his bit.		
available for unclassified	rater body is: Uncl					Special Resour 01.02.95; no	og Water:
Idaho's Beneficial Uses: IDAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Sapply	Cold Water Biota	Warm Water Biota	Selmonid Spewning	Primary Contact Recrustion	Secondary Contact Recreation
Designated Beneficial Uses for this wabody:	ater Ro	по.	yes*	no	no	yes*	50
Maria de la compania del compania del compania de la compania del compania del compania de la compania de la compania del compania dela	† * denotes in	l nplicit designati	i on through IDA	NPA 1601.02.10		To the second	
1988 §305(b) and §303(d) lafe	rmation						
§303(d) listed: no cause:	assessment :	nfo: oot assess	ed in 1988				
Idaho's Beneficial Uses: IDAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Biota	Salmonid Spewning	Primary Contact Recression	Secondary Contact Recreation
status assessment for 1988				- 	· ∱==== } !	 -	-
§303(d) listed: no cause:	#ssessment i	nio : net esses i	ed in 1992				
Idaho's Beneficial Uses: IDAPA 16.01.02,100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biots	Warm Water Biots	Salmunid Spewning	Primery Contact Recreation	Secondary Contact Recreation
status assessment for 1992			1	 	 		-
1994 §305(b) and §303(d) Infor	mation		· · · · · · · · · · · · · · · · · · ·	<u> </u>			
i303(d) listed: no muse:	assessment i	nfo: no water b	odies assessed	in 1994,	•		
daho's Beneficial Uses: DAPA 16.01.02.100	Domentic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water J Biota	Salmonid Spewning	Primary Contact Recreation	Secondary Contact Recreation
tatus assessment for 1994					 		
996 §305(b) and §303(d) Infor	mation			- · · -		-	
303(d) listed: Bo ause;	assessment in	ifo: no water b	odies assessed i	in 1996.		,	
laho's Beneficial Uses: DAPA 16.01.02,100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Biota	Salmonid Spawning	Primary Contact Recreation	Secondary Contact Recreation

, I	D-170501	21-15		Si	ver Creel	k Galag	ups	ream lim	it: headwate	rs .			
ۇ. ۋە د				7	NRS: mobe		dov	nstream 1	mit: Peace	Creek 📜			1 2,
1998	B Dran §.	305(b)	and §303	d) Infort	nation		ħ/a		A Property				
	(d) listed: " :: delisting				ssessment i	nfo:							
idaho	o's Benefici PA 16.01.02	al Uses:			loopestis Vater Supply	Agricultura Water Supp	,	Water	Warm Water Biota	Salmonid Spawning	Frence Cores Recre	á	Secondary Contest Recreation
status	#65CSSEDET	t for 19	98						†			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
1998	Sub-bas	in Ass	essment I	aformati	010								34.
	(d) listed: " delisting		ed"	1	MDL, statu	s: No TMD	l. Planace	Sage 1					
	's Benefici A 16.01.02	C ^ C 8 & C 8 & S	WEY .	C 1000 A A A A A A A A A A A A A A A A A	oducatic Fater Supply	Agricultura Water Sepp	200000	Water	Warre Wester Bigsta	Salmonid Spanning	Pringer Contra Recree	• 3	Secondary Contact Recreation
şub-bi		Design Sta	us ,		• T	# #F	24 34	port		Fall Supper	Fall Supp	ort	
Reco	mmende		gnations :	or Idaho	Water Q	uality Sta	ndards	An i in			t of market of the		
	's Beneficia A 16.01.02				amenic etc Sapely	Agricultural Water Supp		Water	Werm Water Biota	Selmonid Spanning	Primer Contac Rectus		Secondary Contect Recrusion
	usted Bene 050121-15:		es for			100	yes		no	yes*	yes	¥ Vá	20**
• limit	to O. myda	er and S	.con/lucio	a ** accon	fary unnect	ssary when	primæy is	designat	d				e Sec
This was	ter body inc rk are tribu ice with the	indes Si turies to Middle	the main st Fork Payet	from its her em of Silve te River to i	r Creek alo its hendwate	ng with seve	rai unnan usified as	ed tribut a B3 Ros	tries. Silver gen stream t	eck, Eggers C Creek is a thi ype. The cha	rd order stre	का दिला	the
downstra	am from the	e conflu	ence with the	be Middle I ong Fork, I	ork Payette orest Road	: River: For 678 enters	est Service the waters!	Road 67 red from	'i parallels S	pproximately ilver Creek, of t and forms a sard station.	crosses at Uc	on Creek	Le
Upper Si	lver Creek	has not	been monito	ned by DE	Q prior to th	ic BURP eik	T. 44	- ATT-	1993.	·	,	•	
Site ID 93SWIR 93SWIR			ion s. from Uco s. from Pea	n Creck	MB1 4.55 4.35	HI NA NA							
	population (isb) and 2			y 24, 1996	by the Dep	ertment of I	ish & Gar	sc. The r	esults were t	hree age class	ses of wild ra	wodni	
The follo	wing is the	fish dat	a provided l	y Boise Na	stional Fore	st							
ID 93\$LV6 93\$LV7	DATE 7/27/93	A 4 2	B 0 1	C 1 5	D 0 1	E O I	F 0 7	G 0 3	H 3 4	I 1 8			
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93SLV8	7/27/93	3	2	0	0	0	0	0	6	0
93SLV9	7/28/93	3	1	0	_91.4- 0 5j ∰ 4	0	0	30 30 B	. 1	0
93SLV10	7/28/93	4	0	0	0	0 .	. 0	0	0	0
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93SLV12	7/28/93	A Property	Q.	를 들는 0	0	0.2	gr: 0	0 55/6	. 0	0.00
)# #			10.7		- 1988 Sept 1					

A = Rainbow Trout 0-4in.

B = Rainbow Trout 4-8in.

C = Rainbow Trout 8-12in.

D = Rainbow Trout >12in.

E = Cutthroat Trout 0-4in.

F = Cutthroat Trout 4-8in.

G = Cutthroat Trout 8-12in.

H = Brook Trout 0-4in.

I = Brook Trout 4-8in.

Cutthroat Trout are not indigenous to the Middle Fork Payette watershed and are most likely planted.

Aquatic insects and other macroinvertebrates also inhabit this segment. DEQ's aquatic insect monitoring protocol calls for monitoring of aquatic insects in riffle habitat units. The insects collected in 1997 were collected for the riffle habitat. These samples are by no greats definitive but they do give us a good idea of the condition of the aquatic insect community, and from that the relative status of the water quality. The collected insects were of assemblages that generally indicate good water quality.

The habitat in this stream is in good condition for fish. Upper Silver Creek is also considered to be "adjunct habitat" for ball trout. This would indicate that there is suitable habitat for spawning and rearing, however, whether it is used for these purposes is unknown. This watershed it affected by barriers and sediment fied primarily to dispersed recreation. In addition, brook trout occur within the watershed. Opportunities exist to remove brook trout, improve the dispersed recreation and return built trout to suitable habitat within the draining Percent lines were <20%. This transect was dominated by riffles, with pools making up about 20% of the habitat. The majority of the streambanks were in stable condition.

As far at it is known, this water body is free of water column contamination, excepting high levels of event driven suspended sediment. It is not clear if and how this suspended sediment impairs beneficial uses. The stream gradient does not allow for significant deposition of fine sediment. Due to a lack of development in the upper reaches of the stream, bacteria counts should be low.

Numeric criterion in Idaho's Water Quality Standards and Wasternater Treatment Requirements have not been exceeded by any data generated sampling this water body. Based on current assessment protocols, observation, and judgement, this segment full into the "full support" status category for cold water blots beneficial use. Salmonid spawning is occurring and is also in the "full support" status category. Agricultural Water Supply, Domestic Water Supply, Warm Water Blots, and Secondary Contact Recreation are neither designated nor existing and therefore have not been assessed. Primary Contact Recreation are in the "full support" category as well.

ID-17050121-16	Middle Fork P	yette River	upstream limit.	Bell Creek	a de la Santa		es anti-
		13. 00 12.5	dow nitrcii n lim	ft: Silver Cre	ek		r _a dom -
Current Classification in	daho Water Qual	ity Standards		4,778 4 21	ini nat ion	*** *********************************	
map code: SWB-322 T	his water body is: C	lassified	1. 11. 11. 11. 11. 11. 11. 11. 11. 11.	*	Designated S IDAPA 16.01	pecial Resource	Water:
Idaho's Beneficial Uses: IDAPA 16.01.02,100	Domestic Water Sup	Apricultural Water Supply	Biota 1	Wants Water Biota	Salmonid Sparreting	Printary Contact Recreation	Secondary Contact Recreation
Designated Beneficial Uses for t body:		yes		10	yes	yes	yes
	• denote	्र s implicit designal	i i ion through IDAPA	1601.02.101.	01. a		i *
1988 §305(b) and §303(d)	Information					*** **********************************	SELECT
\$303(d) listed: we cause:	ASSESSMEN	nt info evaluatei	**************************************		tina sa marangan sa		
Idaho's Beneficial Uses: IDAPA 16.01.02.100	Domestic Water Supe	Agricultural Water Supply	Bion	Venn Water	Selmonid of Spenning	Primary Counct Recreation	Secondary Contact Recreation
status assessment for 1988	Full Support	Full	Fell Support		Fall Support	Full Support	Fell Support
1992 §30 5(b) and §3 0 3(d) l	oformation	W.F.	was a state of the	; »			, , , , , , , , , , , , , , , , , , ,
(303(d) listed: no cause:		nt info : not asses i					
deho's Beseficial Uses: DAPA 16.01.02.100	Domentio Water Suppl	Agricultural Water Supply		non Water ota	Saleyanid Speciality	Printery Contact Recreation	Secondary Connect Recreation
tatus assessment for 1992							
1994 §305(b) and §303(d) Ii 303(d) listed: yes		t info; no water b	odies sesquel in 19	kirin siyan	ating resulted	from Bolee Na	tional
supe: sediment labo's Beneficial Uses: DAPA 16.01.02.100	Forest an	Agricultural Water Supply	Cold Water Wa	min Water	Since is	Printery Contact Agreemion	Secondary Contact Reconside
tatus assessment for 1994			n type fil en		3 4 / 4 6 7 3 8		
996 §305(b) and §303(d) In		info: no water he	odies assessed in 199		tine resulted		ionel
use: sediment	Forest ens	lyals.		े ज्यान	mark i especie	. west CANSE 1484	IVEE
laho's Beneficial Uses: DAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water War Biota Biot		peroples *	Contact	Secondary Counst Recreation
atus assessment for 1996	<u> </u>	j i		-		e da la	

ID-17050121-16

Middle Fork Payette River

upstream limit: Bull Creek

1998 Draft §305(b) and §363(d) Info	rmation			ffillir i	y of a t es	Market	**************************************
§303(d) listed: yes cause: sediment	assessment in	nfo: DEQ '96 W	BA A				
Idaho's Beneficial Uses: (DAPA 16.01.02,100	Donacatic Water Supply	Agricultural Water Supply	Cold Water Bista	Warm Water Biots	Salmonid Spawning	Primacy Cornact Recreation	Secondary Coorest Recreation
status assessment for 1998	*				- Ag - 35 - 34		<u> </u>
1998 Sub-basin Assessment Informat	tion		nesti a lte tini	ment was to			
[303(d) listed: yes :ause: sediment	TMDL status	No TMBL Pis	nned				
daho's Beneficial Uses: DAPA 16.01,02.100	Desirent Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Blom	Subposed Spewning	Primary Contains ************************************	Secondary Contact Reconsists
	Pall Support	Pull Support	Full Support		Fell 🗼	Folia Support	Full Support
Recommended Designations for Idah	o Water Qu	ality Standa	rds	Norman		N. W. C.	1.
	Domentic Water Supply	Agricultural Water Scopply	Cold Water Siots	Water Water Biota	Salanonid Specialis	Primary Comment	Secondary Contact Recrustion
esignated Beneficial Uses for	lo l	10	ve	no	yes*	yes	#0**

Notes: 1D-17050121-16 Middle Fork Payette River

This water body includes the segment of the Middle Fork Payette River from Silver Creek to Bull Creek. West Fork Creek, Skull Creek, Pine Creek, West Foot Creek, Bridge Creek, Bryan Creek, Dash Creek, Ground Hog Creek, Goat Creek and Lake Creek are tributaries to this segment. The Middle Fork Payette River is a fourth order stream and classified as a C5 Rosgon stream type. The bed and banks are dominated by cobble with occasional gravel, boulders and sand. This segment is a continuation of claryon morphology for the Middle Fork Payette River.

This segment of the Middle Fork Payette River lies antirely within the Boise National Forest with the exception of one section of state land located just north of Boiling Springs. The town of Cronch is located approximately 20 miles downstream from the confluence with Silver Creek, stolling Springs forest companyed and administration site are located along this segment of the river. Forest service road 698 parallels and crosses the river once and dead ends at the administrative site. Forest service road 678 begins at Boiling Springs companyed, crosses the Middle Fork Payette River and proceeds up Bridge Creek to Silver Creek.

This segment of the Middle Fork Psyche River has not been monitored by DEQ prior to BURP monitoring on July 20, 1994 Four sites exist in this segment.

City IPC	
Site ID Location	MBI H
94SWIROA42 @ Boiling Serings CG	
Committee Commit	5.09 102
95SWIROC26 100 feet above Boiling Springs CG	
	4.63
97SWIROA70 Upstream from Boiling Springs CG	4.44 71
97SWIROA73 West Fork Creek @ mouth	
97SWIROA73 West Fork Creek @ mouth	5.03 99

The Boise National Gurest also surveyed this segment several times in 1986.

The fish population has been surveyed by the Boise National Forest (1993) using their aquatic survey database. The results were a reduced rainbow trout population and no bull trout. Additional IDFG fish survey information from July 22, 23 and 24, 1996 is as follows:

Sub-basin Assessment and Total Maximum Daily Load for the Middle Fork Payette River

Location	Hatchery RET	WHI RUT	Mu Whitefuh	Bull Frent	Long Mescal Days
just above FS admin site	0,000	ggargot k ris 🖖	0	· 0	() O
0.7 miles it a from FS admin site		1	*		
I.5 miles u.s. from FS admin site	0	- 1, 8 - 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,		0 10 10 10 10 10 10 10 10 10 10 10 10 10	0
2.2 miles d.s. from FS admin site	0	17	8	,	9
3.9 miles d.s. from FS admin site		. . 15	0	0	0

BURP monitoring found the stream bed to be predominantly cobble followed by small boulders and sand.

A CONTRACTOR OF THE PARTY OF TH

This segment of the Middle Fork Payette River is currently appropriate for and utilized by three species of native selmonid fishes, Whitefish (P. williamson), redband troot (Oncorhynchus sophiss), and ball troot (Salvelinus confluentus). Redband troot use this stream and may be more abundant, year round, if habitat complexity increased, including spawning areas. It is essential that Bull troot be able to better utilize this segment for talguation to the rest of the Payette bull troot populations.

Based on the BURP monitoring, the habitat in this segment is in a fair condition for fish. Riffle habitat dominates this segment of the river, followed by sums and glides. Pools are minor or enturing.

As far as it is known, this water body is free of water column contamination, excepting high levels of event driven suspended sediment. It is not clear if and how this suspended sediment impairs beneficial uses. Due to a lack of development in the watershed, bacteria counts should be low.

Numeric criterion in Idaho's Water Quality Standards have not been exceeded by any data generated sampling this water body. Both macroinventebrate and one of the habitat values show non impairment, based on current assessment protocols. Considering the number and age classes of fish found in the BNF survey, the amount of bed load sediment in this segment does not appear to impair Cold Water Blota as a beneficial use.

All water supply and recreational beneficial uses have been "full support" for the fast five years. Salmonid Spawning beneficial use is also "full support". Both native mountain whitefish and redband trout spawn in this section. Both Mountain whitefish (broadcast spawners) and Redband Trout (redd builders) are successful in this section of the Middle Fork Payette River or neighboring streams. Built trout spawning is only going to occur further up in the watershed.

It is important to note that loss of anadromous fish, introduction of non-native fishes, and nearby stocking of batchery fish for a "put and take fishery" have greatly afficiated the complex interactions of the remaining native salmonids. It is difficult to define or assure recovery given these other population controlling issues.

Sub-basin Assessment and Total Maximum Daily Load for the Middle Fork Payette River

· · · · · · · · · · · · · · · · · · ·			e Mudde Fork Fuyete River
ID-17050121-17	Bull Creek	upstream limit: headwaters	
the second secon	PNRS. 708.00	downstream limit: Middle F	ork Payette River (1904) (1914)
Current Classification in Idaho Wa	ter Quality Standards	12 3 (2) (0,0%, 6 / 8)	J. SEVINOR S. ANN.
map code; map codes not This water bo available for unclassified water bodies	ody is: Unclassified		Designated Special Resource Water: IDAPA 16.01.02.95; no
Idaho's Beneficial Uses: IDAPA 16.01.02.100	Domestic Agricultural Water Supply	Cold Water Warm Water Biots Biots	Seintenid Friency Secondary Sparring Context Context Recrustion Recrustion
Designated Beneficial Uses for this water body:	no no denotes implicit designation	yes" no no through IDAPA (601,02,101.	ao yes* ao
1988 §305(b) and §303(d) Informati	OB C		
§303(d) listed: se	assessment info: not assesse	d in 1988	CREATE STATE
Idaho's Beneficial Uses: A Compression IDAPA 16.01.02.100	Domestic Agricultural Water Supply	Cod Water Water Water Block Block	Spanning Contact Contact Recoggion
status assessment for 1988			
1992 §3 95(b) and §393(d) Information			
§303(d) fisted: ine cause:	assessment into : not assesse	die 1992	
Idaho's Beneficial Uses: IDAPA 16.0 l.02.100	Domestic Agricultural Water Supply	Cold Water Warm Water Biota Biota	Secondary Context Recording
status assessment for 1992			
1994 §305(b) and §303(d) Informatio	a		
§303(d) Nested: mo	assessment info; no water bo	dies assessed in 1994.	
	Domestic Agricultural Water Supply		Salmonic Frimery Secondary Contact Contact Recreation Recreation
status assessment for 1994			
1996 §385(b) and §383(d) Information §383(d) listed: no	ssessment info: no water bod	lics assessed in 1996.	
cause:	Consentio Agricultural	Cold Water Warm Water 5	Salamonid Primary Secondary perveing Contact Contact Recreation Recreation
status assessment for 1996			

esignated Beneficial Uses for D-17050121-17:	50	100	yes	ao	yes	yes	no*
Recommended Designations for Ida Isho's Beneficial Uses: DAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Fri ls Cold Water Biota	Watrit Water Biote	Sakmonid Spanning	Primary Contact Recreation	Secondary Contact Regression
ub-basin assessment status			Full Support		Fell Sapport	Full Support	
daho's Beneficial Uses: DAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Waste Biota	Salatorid Spenging	Princery Custosi Recrestion	Secondary Contact Recreation
1998 Sub-basin Assessment Inform 1303(d) listed: no ause:	ation TMDL status						. :
tatus assessment for 1998			100 mm	nes is the contract of			
6303(d) listed; no cause; (daho's Beneficial Uses; (DAPA 16.01.02.100	essessment in Domestic Water Supply	Agricultural Water Seppty	Cald Water Biota	Wanta Water Biota	Salmonid Spawning	Printery Coonect Recognition	Secondary Contact Regression
1998 Draft §305(b) and §303(d) Inf	ormation 🐇	ij fajktaj					
	PNRS: 708.00		downstream l	imit: Middle Fo	rk Payette Ri	ier	

Notes: ID-17050121-17 Bull Creek

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This water body includes Buil Creek from its headwaters to the confluence with the Middle Fork Payette River. Sixteen-to-one Creek and Oxtail Creek are tributaries to the main stem of Bull Creek along with several unnamed tributaries. Bull Creek is a third order stream from the confluence with the Middle Fork Payette River to its headwaters and is classified as a B3 Rosgen stream type.

The Bull Crack watershed lies entirely within forest service land. There are no roads in the watershed.

Bull Creek has not been monitored by DEQ. Bull Creek has been monitored by Boise National Forest. The following is from their surveys:

ID ****	DATE	Ã		В	, a	C	37	D
93BULO 💎 💆	8/27/93	0		0		0		0
93BULI	8/27/93	7		2		0		0
93BUL2.5	8/27/93	· 7	100	1 .		0		0
93BUL3.5	8/27/93	<u> </u>		3 .	٠.٠"	0		Ð
93BUL4.S	8/27/93	6	a trigger La div	1		0		0
93BUL5.5	8/27/93	_ 1		0		1		0
93BUL6.5	9/12/93	0	. 100 - 100	0		0		0
93BUL7.5?	8/27/9 3	0	100	0		0		0
93BUL8.5	8/27/93	0	3 • (0		2	•	0
93BUL9.5	8/27/93	ł	300 °±'	0		0		0
93BUL10.5	9/11/93	0	(0		0		1
93BUL11 🧼 🦝 🚁	9/11/93	0	. (0		3		3.
93BULI2	9/11/93	0	(0		0		ŀ
		3						

A = Rainbow Trout 0-4in.

Sub-basin Assessment and Total Maximum Daily Load for the Middle Fork Payette River

B = Rainbow Trout 4-8in.

C = Bull Trout 0-4in.

D = Brook Trout 0-4in.

Based on limited access and management, the habitat in this stream should be in good condition for fish. Bull Creek also combins "adjunct habitat" and "focal habitat" (in the headwaters) for bull trout. "Adjunct habitat", below mile 5, would indicate that there is suitable habitat for spawning and rearing, however, whether it is used for these purposes has not been documented. "Focal habitat", above mile 5, currently supports bull trout spawning and rearing. Bull Creek contains a depressed bull trout population. It appears to be threatened by brook trout in the headwaters and naturally high sediment levels within the roadless area.

As far as it is known, this water body is free of water column contamination, excepting high levels of event driven suspended sediment. It is not clear if and how this suspended sediment impairs beneficial uses. The stream gradient does not allow for significant deposition of fine sediment. Due to a lack of development in the upper reaches of the stream, bacteria counts should be low.

Numeric criterion in Idaho's Water Quality Standards and Wastewater Treatment Requirements have not been exceeded by any data generated sampling this water body. Based on current assessment protocols, observation, and judgement, this segment fall into the "full support" status category for cold water biota beneficial use. Salmonid spawning is occurring and is also in the "full support" status category. Agricultural Water Supply, Domestic Water Supply, Warm Water Biota, and Secondary Contact Recreation are neither designated nor existing and therefore have not been assessed. Primary Contact Recreation are in the "full support" category as well. As far as it is known, this water body is free of water column contamination, excepting high levels of event driven suspended sediment. It is not clear if and how this suspended sediment impairs beneficial uses. The stream gradient does not allow for significant deposition of fine sediment. Due to a lack of development in the watershed, bacteria counts should be low.

[D-1705012]-18	lle Fork Payet	te River	v spsucan lim	it headwalery	<i>*</i>		
general Co.	PNRS: 703.00	78 C	downstream	limit: Bull Cree	K 73.53		
Current Classification in Idaho V	ater Quality	Standards "		*	#81.e.,;e		
map code: SWB-322 This water						pecial Resource	
			1 2		IDAPA 16.0	1	83. v. l
Idaho's Beneficial Uses: IDAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Biota	Salmonid Spewning	Primary	Secondary Contact Recression
Designated Beneficial Uses for this water	-	y⇔	yes	no no	l yes	yes *	yes
body:	76				•		1
	* denotes im	plicit desi gnati	on through EDA	PA 1601.02.101	.01.a.		
1988 §305(b) and §303(d) Inform	stion						de e
§303(d) listed: #6	ussessment i	ofo: evaluated					
CRESC STORY 	Domestic	Agricultural	Cold Water	Warra Water	Selmonid		Secondary
Idaho's Beneficial Uses IDAPA 16.01 02.100 - 17 561	Water Souply	Waser Society	Biota	Biota	Speeding	Contact Recreation	Contact Recreation
Status assessment for 1988	Fell	Pull -	Full		Full Tolk	Full	Fell
	Support	Support	Support		Support	Support	Support
1992 §305(b) and §303(d) Inform	ttion						
303(d) listed: no	assessment i	nfo : evaluated					
delige Beneficial Uses:	Demonia	Agricultural	Cold Water	Warn Water	Subspoid		Secondary
DAPA 16-01.02.100	Warter Stappily	Water Supply	Biota	Bana.	Spending	Contact Recreation	Contact Recreation
status assessaricait for 1992	Full	Full	Partial		Full	Foll	Full Support
	Support	Support	Sapport		Support	Support	aupport
1994 §305(b) and §303(d) Informs							-48
303(4) listed: yes =us: sedback:	ar 11	fo: no water bo da.	odies astessed i	n 1994. 303(d)		- A	T GODDI
deba's Denoticial Care:	Domestic Water Supply	Agricultural	Cold Water Biota	Warn Water Biota	Selmonid Sourcing	Prigoscy Contact	Secondary Contact
DAPA 16.01.02.100 😭		Water Supply		45.74		Recrution	Remation
tatus assessment für 1994		140 A 150			the York		Maria de la compansión de
996 §305(b) and §303(d) Informa	tion 🐔						
303(d) listed: yes ause: sediment	assessment in Forest analys		dies essessed i	n 1996. 3 03 (4)	listing resulted	l from Boise N	ational
	Domestic	Agricultural	Cold Water	Waten Water	Salmonid	Primary	Secondary
daho's Beneficial Uses: DAPA 16.01.02.100	Water Sapply	Water Supply	Biota	Biota	Spewming	Contact Recreation	Contact Recreation
tatus assessment for 1996					·		

ID-17050121-18

Middle Fork Payette River

upstream limit; beadwaters

PNRS: 703.00

downstream limit: Buil Creek

§303(d) listed: no :ause:	assessment in	fo:					
daho's Beneficial Uses: DAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Biota	Sulmanid Spawning	Primary Contact Recrusion	Secondary Contact Recreation
tatus assessment for 1998							*88
998 Sub-basin Assessment Inform	ation		\$ 2 2000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 -				\$\$
303(d) listed: no mise:	TMDL status						
aho's Beneficial Uses: DAPA 16.01.02,100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biote	Warm Water Blots	Submitted Spanisher	Primary Contact Recreasion (1987)	Secondary Contact Recreation
b-basin assessment status			Fell Support		Full Support	Full S. Sepport	
ecommended Designations for Ide	ho Water Q	ality Standa	rds		A with the state of the state o	S. Sheet	
aho's Beneficial Uses: DAPA 16.01.02,100	Dountation Water Supply	Agricultural Water Supply	Cold Water Biots	Warra Water Biota	Submerrid Specifics	Postacy Contact Societics	Secondary Contact Excresion
esignated Beneficial Uses for 0-17050121-18:	yes	ya 📖	yes 🦠	190	yes	yes .	#0*

Notes: ID-17050121-18 Middle Fork Payette River

This water body includes the segment of the Middle Fork Payette River from Bull Creek to the headwaters. Fool Creek and Ligget Creek are the only two named tributaries to this segment. The Middle Fork Payette River is a second order stream and classified as a B Rosgen stream type at it's mouth. The bed and banks are dominated by cobble with occasional gravel, boulders and sand. This segment is a continuation of carryon morphology for the Middle Fork Payette River.

This segment of the Middle Fork Payette River lies entirely within the Boise National Forest. There is no development in this segment, and it is predominantly unroaded. Forest road 409 runs parallel to the river from the headwaters for approximately two miles. Forest road 405 enters the watershed from Clear Creek and dead ends approximately ½ mile from the river. Forest road 475 also enters the watershed and dead ends at Ligget Creek.

This segment of the Middle Fork Payette River was first monitored by DEQ on August 7, 1996. One site exists in this segment.

Site ID 96SWIROA78	Location @ trail 79 crossing ju	tt west of Possibe P		
Cian III	Tanadian		MBI	S. ar a. Elli
-				_

BURP monitoring found the stream bed to be predominantly cobble followed by gravel, small boulders and sand.

The following is the fish data provided by Boise National Forest:

ID		DATE	A	В	C	, D	E
94MFP45.5	-	na	. 0	0	0	0	1 199
93MFP42.5	Magazine	πa	12	4	0	2	0
93MFP43		па	0		0	0	0
93MFP44.5	:	na	Ö	0	i	5	0

Sub-basin Assessment and Total Maximum Daily Load for the Middle Fork Payette River

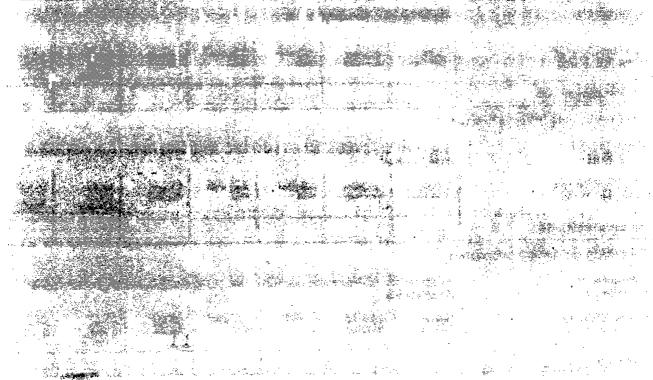
93MFP45 to the control of the contro	0 17 10 0	
93MFP33.5 2 29/93 0 7	O of the O	Company of the Compan
93MFP34.5 8/29/93 1 16	0 0 0 0	
93MFP36 2 28/29/93 2 20	2 1 7 0 7 0 0 0 0 0	
A = Rainbow Tront 0-4in.		
B = Rainbow Trout 4-8in. C = Bull Trout 6-4in.		
D = Bull Trout 4-8ia		
E - D - L T	Zo bo bo boli kanala Walish Kariba k	

This segment of the Middle Fork Payette River is currently appropriate for and utilized by two species of native salmontd fishes, "reduced trout (Oucorhymehus mydias), and bull trout (Salvetinus confluentus). Based on limited access, and management, the habitat in this special should be in good condition for fish. This segment of the Middle Fork Payette River also contains "adjunct habitat" (below mile 36) and "fiscal habitat" (in the headwaters, above mile 36) for bull trout. "Adjunct habitat" would indicate that there is suitable habitat for spawning and rearing, however, whether it is used for these purposes has not been documented. "Focal habitat" currently supports buil trout spawning and rearing.

Based on the BURP monitoring for this segment, the habitat in this segment is in a good condition for fish. Riffle habitat dominates this segment of the river, followed by mass and glides. Pools make up about 5% of the habitat.

As far as it is known, this water body is free of water column contamination, excepting high levels of event driven suspended sediment. It is not clear if and how this suspended sediment impairs beneficial uses. Due to a lack of development in the watershed, becteria counts should be low.

Numeric criterion in Links 's Water Quality Standards and Wastewaser Treatment Requirements have not been exceeded by any data generated sampling this water body. United the cannot assessment protocols, observation, and judgement, this segment fall into the "full support" status category for cold states blood beneficial use. Salmented spawning is occurring and is also to the "full support" status category. Agricultural Water Supply, Domestic Water Supply, Water Blota, and Secondary Contact Recreation are neither designated nor existing and therefore have not been assessed. Primary Contact Recreation are in the "full support" category as well. As far as it is known, this water body is fine of water column contamination, excepting high levels of event driven suspended sediment. It is not clear if and how this suspended sediment impairs beneficial uses. The stream gradient does not allow for significant deposition of fine sediment. Due to a lack of development in the watershed, basteria counts thought he low.



ID-17050121-19	Scriver Cro	A STATE		nit: Middle Fo			
Current Classification in Idaho V	ater Quality	Standards			97.92 E. J. S.		
map code: map codes not This water available for unclassified water bodies	body is: Unc	lassified				Special Resour 01,02.95: no	ce Water:
Idaho's Beneficial Uses: IDAPA 16.01.02.100	Donocatic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Bioxa	Salmonid Spewning	Primary Contact Recreasion	Secondary Contact Recreation
Designated Beneficial Uses for this water body:	50		yes* ion through IDA	B6	mo	yes*	80
1988 §305(b) and §303(d) Informs	a se taska i se si tawa				1.71.4		
§303(d) listed; so Crose:		info: not assess	ed in 1966	og ge¶£.≠.;;#		er verr	
Idaho's Beneficial Uses: IDAPA 16.01.02.100	Downste Was Supply	Agricultural Wester Supply	Cold Wass Binns	Welli West Biots		Fragery Contact Reconstant	Secretary Contact Recreation
status assessment for 1988						1	
5303(d) listed: no cause: daho's Beneficial Uses: DAPA 16.01.02.100	Domestic Water Supply	Mericebural Water Supply	Cold Water Biggs	Waren Water Blota		Princery Connect Recommend	Secondary Connect Recreasion
tatus assessment for 1992	 						†
994 §305(b) and §303(d) Informat	ion	<u> </u>	1	*		e e e e e e e e e e e e e e e e e e e	A.
303(d) listed: yes nuse: sediment	assessment i Forest analy	nfo: ue water b vsis.	odies essessed i	n 1994. 303(d)	Asting results	ed from Boise N	intional
iaho's Beneficial Uses: DAPA 16.91.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Biots	Salamaid Sparening	Primary Contact Retreation	Secondary Contact Recreation
atus assessment for 1994							
996 §305(b) and §303(d) Informati	ЮЩ		* · · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·			
03(d) listed: yes uso: sediment	assessment in Forest analy	fo: no water bo sis.	odies assessed is	1996. 363(d)	listing resulte	d from Boise N	ational
aho's Beneficial Uses: DAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Werm Water Biots	Salmonid Spawning	Primary Contact Recreation	Secondary Contact Recreation
thus assessment for 1996						 	

ID-17050121-20	Scriver Creck			mit: beadwater 	s Fork Scriver (reek 💥 📜	
Current Classification in Idaho W	ater Quality St	andards					
map code: map codes not This water available for unclassified water bodies	body is: Unclass	ified				Special Resour 01.02.95: no	ce Water.
Idaho's Beneficial Uses: IDAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Wages Water Biota	Salmentel Spawning	Primary Contact Recrustion	Secondary Contact Recreation
Designated Beneficial Uses for this water body:	• denotes impl	ao icit designati	yes* on through ID/	MB LPA 1601.02.10	100 101,014		100
1988 §305(b) and §303(d) Informa §303(d) limid: so cause:	tien	A 0 26212 C 25	THE PERSON NAMED IN COLUMN	64-a 14-	er de transcription de la communicación de la	Total Speciment Com-	A TOWN
Idaho's Benisticki Uses; IDAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	West West Blets	المستعدد الم		Secondary Contact Retrestion
status assessment for 1988							
1992 §305(b) and §303(d) Informat §303(d) listed: no cause:	tion assessment info	: not assess	ed in 1992				
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status assessment for 1992		·	1 h/v;	<u>l</u>			t en
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status assessment for 1994		. '		Aven x			r 🎉 (See 19
1996 §365(b) and §303(d) Informati §303(d) listed: yes cause: sediment	essessment info: Forest analysis.	no water bo	dles assessed i	■ 1996. 303(d)	listing resulted	from Boise N	ations!
Idaho's Beneficial Uses: IDAPA 16.01.02.100 4-		gricultural ater Supply	Colé Water Biota	Warra Water Biota	Sabronid Spawning	Primary Contact Repression	Secondary Contact Recreation
status assessipping for 1996					i i		1884 G-1

ID-17050121-20

Scriver Creek

upstream limit: headwaters

	PNRS: none		downstream l	imit: Middle F	ork Scriver Cr	cek	
1998 Draft §305(b) and §303(d) In	ormation	a brazin			5:14:15 ;		7.
§303(d) listed: "no cause: delisting proposed"	assessment in	nfo:					
Idaho's Beneficial Uses: IDAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biots	Warm Water Biota	Salmonid Spawning	Primery Contact Recreation	Secondary Contact Recreation
status assessment for 1998			į	 	 		
1998 Sub-basin Assessment Inform	ation	,		•			*
§303(d) listed: "no cause: delisting proposed"	TMDL status	:					
Idaho's Beneficial Uses: IDAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Biota	Salmonid Spawning	Primary Contact Recreation	Secondary Contact Recreation
sub-basin assessment status	1		Fell Support	-	Fall Support	Full Support	
Recommended Designations for Ids	ho Water Q	sality Standa	rds	•	<u> </u>	· .	
daho's Beneficial Uses: DAPA 16,01,02,100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Biota	Selmonid Spending	Printerry Contact Recrution	Secondary Contact Recreation
Designated Beneficial Uses for D-17050121-20:	5 0	BO .	yes	BC	yes	yes	B0*
secondary unnecessary when primary is de	signated			L -172			<u> </u>

Notes:

ID-17050121-20 Scriver Creek

This water body includes Scriver Creek from its headwaters to the Middle Fork Scriver Creek. There are several small tributaries to the main stem of Scriver Creek, Middle Fork, West Fork and Bear Wallow Creek, Scriver Creek is a second order stream above Middle Fork Scriver Creek and is classified as a B Roagen stream type. The bed and banks are dominated by cobble followed by gravel, boulders and sand.

The watershed includes state and forest service land. The sown of Crouch is located five miles downstream from the confluence of Scriver Creek and the Middle Fork Payette River. Forest Service Road 693 parallels Scriver Creek for almost its entire length and crosses twice during the length of this water body.

The upper portion of Scriver Creek has not been monitored by DEO.

The following is the fish data provided by Boise National Forest:

SITE	DATE	A	В	C	D
94WSCR0?	na	1	1	1 6	0
94WSCR1?	O.A.	5	0	8	4

A=Rainbow trout 0-4 in.

B=Rainbow trout 4-8 in.

C=Brook trout 0-4 in.

D=Brook trout 4-8 in.

As far as it is known, this water body is free of water column contamination, excepting high levels of event driven suspended sediment. It is not

ID-17050121-19	Scriver Creel	•	upstream limi	t: Middle Fork	Scriver Creel	k : 27k3+88	
Company of the Company	PNRS wome		downstream I	mit: Middle F	ork Payette Ri	ver 🥬 🦿	
1998 Braft §305(b) and §303(d) in	ormation .		"FILE ST	Mar 179	种种种的	Politică Žetinore	扛
§303(d) listed: "no cause: delisting proposed"	assessarent in	fo:			1		
Idaho's Beneficial Uses. IDAPA 16.01.02.100	Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warra Water Biota	Salmonal Spauring	Primary Contact Recreation	Sectoriary Contact Recreation
status assessment for 1998							
1998 Sub-basin Assessment Inform	ation						
6303(d) listed: "ne cause: delisting propaged"	TMDL steens						
idaho's Beneficial Uses. IDAPA 16.01.02,100	Delening Water Supply	Agressiterel Weter Supply	Cold Water Biota	Warm Water Biota	Submorted Specialists	Primery Contact Recreation	Secondary Contact Recreasion
nub-basin atsessmost status			Full Support		Full Sapport	Full Sepport	
Recommended Designations for Ide Idaho's Beneficial Uses: IDAPA 16.01.02.100	Domestic Water Supply	Agricultural Weier Supply	Cold Water Base	Warm Water Biota	Stepand School	Promission of the Commission o	Secondary Contact Recommon
Designated Beneficial Uses for ID-17050121-19:	RO	20	ye	1 0	yes	98	10"
secondary unnecessary when primary is de	signated 💮					<u> </u>	

Notes: ID-17050121-19 Scriver Creck

This water body includes Scriver Creek from Middle Fork Scriver Creek to the Middle Fork Payette River. There are several small tributaries to the main stem of Scriver Creek, Pinney Creek, Left Fork, Hidden Creek and Middle Fork. Scriver Creek is a third order stream from the confluence with the Middle Fork Payette River to Middle Fork Scriver Creek and is classified as a B Rosgen stream type. The bed and banks are dominated by cobble followed by gravel, bonkers and sand.

The lower three miles of Seriver Creek flows through private land, with some development. The watershed also includes state and forest service land in the headwaters and two small parcels of BLM land. The town of Crouch is located five miles downstream from the confluence of Seriver Creek and the Middle Fork Payette River. Drinking water for development in the area is supplied by wells, and wantewater disposal utilizes septic tanks. Some of the low lying land immediately adjacent to Seriver Creek is used as pasture or wetland sinks. Posest Service Road 693 parallels Seriver Creek for almost its entire length and crosses twice during the length of this water body.

Scriver Creek has not been manifered by DEQ prior to the BURP monitoring August 12, 1993. One site (938WIRO19) was established just upstream of the forest service boundary. The forest service submitted Baseline Inventory information taken September 16, 1986.

The following is the fish data provided by Boise National Forest:

				2.51		3. % 7		
ID .		DATE	3,0		Α	B	С	D
94SCR6		68			15	10	9	15
94SCR7	na		6	8	4	23	5	
94SCR#		nz			4	l i	3	6
949C'2907	Rs		1			۸	0	-

A=Rainbow trout 0-4 in. B=Rainbow trout 4-8 in. C=Brook trout 0-4 in.
D=Brook trout 4-8 in.

Habitat information (percent fines 7.5%) and macroinvertebrate data (several cold water indicators) indicate that this stream should support a fishery.

Aquatic insects and other macroinvertebrates also inhabit this segment. DEQ's aquatic insect monitoring protocol calls for attentioning of aquatic insects in riffle habitat units. The insects collected in 1993 were collected for the riffle habitat. These samples are by no means definitive but they do give us a good idea of the condition of the aquatic insect community, and from that the relative status of the water quality. The collected insects were of assemblages that generally indicate good water quality.

The habitat in this segment is in fair to good condition for fish. Cobble (64-256 mm) dominate channel bed and banks. Gravel/boulder bars are frequent. Pools make up about 25% of the stream with the remainder dominated by riffles.

As far as it is known, this water body is free of water column contamination, excepting high levels of event driven suspended sediment. It is not clear if and how this suspended sediment impairs beneficial uses. The stream gradient does not allow for significant deposition of fine sediment. Due to a lack of development in the upper reaches of the stream, bacteria counts should be low.

Numeric criterion in Idaho's Water Quality Standards have not been exceeded by any data generated sampling this water body. The previously mentioned BURP monitoring and the available fish information indicate this stream fully supports cold water biots as a beneficial use.

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Sub-basin Assessment and Total Maximum Daily Load for the Middle Fork Payette River

clear if and how this suspended sediment impairs beneficial uses. The stream gradient does not allow for significant deposition of fine sediment. Due to a lack of development in the upper reaches of the stream, bacteria counts should be low.

Numeric criterion in Islands & Water Quality Standards have not been exceeded by any data generated sampling this water body. Based on the lack of development and management in this watershed and the relative abundance of fish considering the size of the stream, this stream fully supports cold water blota as a beneficial use.

		Fork Scrive PNRS: none	es paiškumia .	downstream	downstream limit: Scriver Creek					
Current Classification in map code: map codes not available for nuclassified water bodies	Idaho Water	er Quality :	Standards				Special Resou 1.02.95: no	rce Water.		
idaho's Beneficial Uses: DAPA 16.01,02.100		Domestic Water Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Biota	Selmonid Spawning	Primary Contact Recreation	Secondar Contact Recreatio		
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laho's Beneficial Uses: DAPA 16.01.02.100		Domestie Water Supply	Agricultural Water Supply	Cold Water Biots	Warm Water Biots	Selmonid Spewning	Primary Contact Recreation	Secondary Contact Recrustion		
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992 §305(b) and §303(d) 303(d) listed: no susc: labo's Beneficial Uses: DAPA 16.01.02.100			fo; not assess Agricultural Water Supply	ed in 1992 Cold Water Biotz	Warm Weter	Salmonid Spawning	Primary Contact Recreation	Secondary		
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sho's Beneficial Uses: APA 16.01.02.100		Communic Vator Supply	Agricultural Water Supply	Cold Water Biota	Warm Water Biota	Salmonid Spawning	Primary Contact Recreation	Secondary Contact Recreation		
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assessment info: no water bodies assessed in 1996.

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§303(d) listed: 20

Sub-basin Assessment and Total Maximum Daily Load for the Middle Fork Payette River

ID-17050121-21 Middle	Fork Scriver	Creek	upstream limi	t bendwaters			er To the second
				K 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		Marks Assess	
	PNRS: noue	i • (4 80 t) • (4)	gownstream i	imlt: Scriver C	reek	A Secretary	
Idaho's Beneficial Uses:	Domesia	Agricultural	Cold Water	Warm Water 1	Subsect for	Printery 784 s.	Secondary
IDAPA 16.01.02.100	Wester Supply	Water Supply	Biota	Biota	Spawneng	Contact	Contact
·	}	· · · · · · · · · · · · · · · · · · ·	 			Recreation	Recrestion
status assessment for 1996	1 1		·		V 70.4		

upstream limit: headwaters ID-17050121-21 Middle Fork Scriver Creek PART TO PNRS: none downstream limit: Scriver Creek 1998 Draft §305(b) and §303(d) Information assessment info: 8303(d) listed: no CHISC: Agricultural Warm Water Idaho's Beneficial Uses: Cold Water Water Supply IDAPA 16.01.02.100 status assessment for 1998 1998 Sub-basin Assessment Information §303(d) listed: no TMDL status: Idaho's Beneficial Uses: Cold Water Contact Water Supply IDAPA 16.01,02,100 -- 8 sub-basin assessment status Fall Full Fщ $\langle \hat{e}_{ij}^{(t)} - \hat{e}_{ij}^{(t)} \rangle$ W. 11.29 Support Support Support Recommended Designations for Idaho Water Quality Standards Idaho's Beneficial Uses: IDAPA 16.01.02,100 Designated Beneficial Uses for 80 yes ma Yes YES ID-17050121-21:

Notes: ID-17050121-21 Middle Fork Scriver Creek

* secondary tennecessary when primary is designated

This water body includes Middle Fork Scriver Creek from its headwaters to Scriver Creek. There are several unnamed tributaries to the Middle Fork Scriver Creek is a second order stream and is classified as a B Rosgen stream type. The bed and banks are dominated by cobble followed by gravel, boulders and sand.

The watershed includes state and forest service land. The town of Crouch is located five miles downstream from the confluence of Scriver Creek and the Middle Fork Payette River. Forest Service Road 695 crosses the creek in the upper part of the watershed.

The following is the fish data provided by Boise National Forest:

SITE	DATE	Ä	A	В	С	D
94MSCR0	La Santa Anna Anna		10	12	2	3
94MSCR1			12	14	0	0

A=Rainbow trout 0-4 in.

B-Rambow trout 4-8 in.

C=Brook trout 0-4 in.

The second secon

D=Brook trout 4-8 in.

As far as it is known, this water body is free of water column contamination, excepting high levels of event driven suspended sediment. It is not clear if and how this suspended sediment impairs beneficial uses. The stream gradient does not allow for significant deposition of fine sediment. Due to a lack of development in the upper reaches of the stream, bacteria counts should be low.

Numeric criterion in Idaho's Water Quality Standards have not been exceeded by any data generated sampling this water body. Based on the tack of development and management in this watershed and the relative abundance of fish considering the size of the stream, this stream fully supports

cold water biota as a beneficial use.

Appendix B: Middle Fork Payette River Sediment Load Estimates and Reach Transport Capacities

1. Introduction with the second

The Middle Fork Payette River typically receives sediments from landslides, forest roads, unstable stream banks, and exposed soil areas due to construction and agriculture activities. Gravel sized sediments (<8 mm) originating in the upper watershed and tributaries are routed down steep channels and accumulate in the flatter reaches in the lower portion of the basin. Sediment monitoring over the past year has indicated that the sediment loads entering the Middle Fork Payette River do not produce high turbidities or suspended sediments, but do contribute a large amount of material to the bedload (Fitzgerald et al., 1998b). The primary nonpoint sources (NPS) of pollutants in the Middle Fork Payette River basin are forest management activities, grazing, small scale agriculture operations, county road construction and management, urban runoff, and land development activities.

The narrative Idaho water quality standard for sediment states that "sediment shall not exceed quantities... which impair designated beneficial uses" (IDAPA 16.01.02.200.08.). The sediment targets established by this document is an interpretation of this narrative water quality standard. Section 2 of this TMDL examines how the identified beneficial uses are impacted due to excess sediment. Based on this analysis targets are established for an ullowable amount of sediment above background for each of the impaired reaches within the Middle Fork Payette River sub-basin.

Sediment loads can be characterized by their frequency of delivery, particle size compositions, and amounts. For example, surface erosion from new road construction can deliver fine sediments to a stream on a frequent basis over a two to three year period. The high frequency of this delivery can combine with a large amount of available material when many new roads are constructed at once, thus producing a large sediment load. Once a road has aged a few years, the frequency and amount of fine sediment delivery diminishes dramatically. Debris flows and other forms of mass wasting, on the other hand, can deliver a large amount of fine and coarse sediments to a stream during a single event. The remaining debris flow paths which remain after the event can produce surface erosion for a few years, much like a newly constructed road. Additional characteristics of debris flow deliveries are that they often occur during high stream flow events and occur less frequently than new road construction surface erosion sediment delivery events.

In order to define an excessive sediment load, the receiving body's assimilative capacity needs to be evaluated. Assimilative capacities of a receiving body can change according to flow sediment particle size, and channel geometry. Frequent delivery of fine sediments from excessive surface erosion is thought to impact the channel bed surface composition, shifting the composition from a more coarse to a more fine particle size distribution. Frequent delivery of coarse and fine sediments from frequent mass wasting, on the other hand, is thought to impact the channel geometry by shallowing and widening it. Additionally, the frequency of sediment delivery can influence a stream's assimilative capacity. Rare and infrequent mass wasting events, for example, tend to cause few changes to the channel geometry. If the frequency of these events increase, the channel may accommodate these ongoing sediment loads by widening and shallowing. This follows the observations that as the sediment load increases over a long period, the channel configuration changes in order to accommodate (i.e., transport) this sediment load.

The load capacity and allocations proposed for the Middle Fork Payette River within this TMDL are based

on the results of an analysis of reach transport capacity. This analysis utilizes the current reach geometry characteristics, estimated background sediment levels from BoiSed, the Parker Transport Capacity Equation, and a sediment transport coefficient. Essentially, background sediment rates are estimated using BoiSed; the amount of sediment transported to a stream from an upslope activity is estimated using a sediment delivery coefficient; and the transport capacity and rate of deposition down the mainstem of the Middle Fork Payette River is estimated using the Parker Transport Capacity Equation. The rate of sediment deposition was then increased until the rate of deposition within each reach was 50% above estimated background deposition rates.

2. Background Sediment Load

Natural and management induced sediments sources in the Middle Fork Payette River have been studied by numerous individuals and agencies. The climatic, hydrologic, geologic, soils, vegetation and landform characteristics of this watershed are the cause of naturally high erosion rates (Reinig et al., 1991; Clayton, 1986; Megahan and Ketcheson, 1996; USDA, 1976). Historic and present land use have increased erosion rates and sediment yield, and caused excess sedimentation of the mainstern Middle Fork Payette River.

Once sediment reaches an active stream channel there are a variety of hydrologic processes that store or transport sediment down-stream. Sediment storage and transport are a function of sediment characteristics (e.g., input grain size distribution and fall velocity), channel energy dissipation (i.e., roughness), reach slope, and flow level. When the sediment input is increased within a stream system an overall decrease in the mean particle size or a widening and shallowing of the channel geometry occurs due to the change in the sediment transport capacity of a reach.

2.1. Background Hillslope Erosion Rates

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Natural hillslope erosion processes include hillslope creep, mass failure, and surface erosion. Acceleration of erosion rates prior to anthropogenic land use change likely occurred as a result of fire and episodic precipitation, snowmelt, and flood events. In the Middle Fork Payette River, natural sources of sediment that results from bank erosion and channel degradation appear to be low relative to hillslope erosion rates.

Land managers within the Middle Fork Payette River sub-basin have evaluated background and management related crossion rates through the use of models. Two of these include BoiSed (Reinig et al., 1991) and SedMod (Boise Cascade, 1998). Background erosion rates in BoiSed are based on erosion rates measured during a long term study within the Silver Creek drainage of the Middle Fork Payette River basin. These background rates include sediment inputs from hillslope creep, landslides, and other erosion mechanisms present under natural forested conditions (Table 1),

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Table 1: BoiSed Background Hillslope Sediment Production with Sediment Transport Coefficient

	Background			Discharge Adjusted		Special Special	Amount
	Sediment *	Potential Stream	Discharge	Potential Stream	Deposition	Sediment Transport	Delivered (tonnes/yr;
Pure Watersheds	tons/yr)	Power	Coefficient	Power**	Ratio	Coefficient***	tons/yr)
Upper MF Payette	1205; 1328	0.078	0.092	0.007	0.562	0.013	16; 17
Bull Creek	977; 1077	0.098	0.158	0.015	0.334	0.046	: A5; 5 0 · · ·
Bridge-Bryon	1230; 1356	0.236	0.033	0.008	⊛ 0.477 ⊜-	0.016	20; 22
Sixmile	1852; 2041	0.112	0.040	. 0.005	Ø 0.553	0.008	15; 16
Silver Creek	985; 1086	0.095	0.169	0.016	0.407	0.039	38; 42
Rattiesmike	255; 281	0.160	0.032	0.005	0.485	0.011	2.8; 3.1
Rocky Canyon	529; 583	0.637	0.076	0.048	0.712	0.068	36, 40
Building Creek	491:541	. 0.197	0.052	0.010	0.249	0.041	20; 22
Lightning Creek 🔏	£621; 6 8 5	0.180	Ø.096	0.017	0.344	* 10.05 0	31; 34
Pyle make	¥387; 422 »	0.2 62	().120	, O.031	1.046	. (O.030)	12; 13
Scriver Creek 😘	**8 31; 916 *	0.209	#Q116 *	0.004	₩/0.463 →	× 280,052 5#	43; 48
Anderson Creek 🍻 :	1046; 1153	0.167	0.143	. 0.024	0.370	····· 0.065 ·····	68; 75

- Based on BoiSed Background Sediment Rate Estimates
- ** Stream Power x Discharge Coefficient (Fitzgerald et al, 1998a)
- *** Adjusted Stream Power/Deposition Ratio (Fitzgerald et al., 1998a)

3. Middle Fork Payette River Streamflow

The transport capacity analysis used to determine hillslope erosion targets is based on existing reach geometry and the recurring two-year flow. A two-year flow per drainage area relationship was used to estimate the recurring two-year flow for each reach examined.

3.1. Annual Hydrograph

A long record of streamflow data is unavailable for the Middle Fork Payette River. However, a USGS gage on the South Fork Payette River at Garden Valley, Idaho, and a USGS gage on the main Payette River at Banks, Idaho were in operation between 1921 and 1960. The difference between these two gages includes the Middle Fork Payette River sub-basin and side drainages between Garden Valley and Banks. The annual hydrograph for the Middle Fork Payette River sub-basin from this analysis is presented in Figure 1.

A storm frequency and duration analysis was conducted for the Middle Fork Payette River and side drainages using the USGS daily flow data (IDEQa, 1998). Storm duration for the two-year flow was approximately 2 days.

Flow data is also available from a short-term monitoring study conducted by the EPA within the Middle Fork Payette River basin during the spring of 1998 (Fitzgerald, 1998). Flow was measured during a bankfull storm event on March 25, 1998. These flows were plotted against the drainage area for the reach for the following relationship:

$$Q_2 = 1.8 A_2^{1.2109}$$

where:

 Q_2 = Bankfull Discharge (cfs) A_{dr} = Drainage Area (mi²)

The two-year flow used in the transport capacity analysis relied on this relationship.

4. Sediment Transport Analysis

Once sediment has reached an active stream channel there are a variety of hydrologic processes that store sediment in an active channel or transport sediment down-stream. Sediment storage and transport are a function of sediment characteristics (i.e., input grain size distribution, fall velocity, shear stress), channel roughness, reach slope, and flow level. Also, as mentioned above, when the amount and frequency of sediment input changes, changes to channel geometry an overall decrease in the mean particle size may occur. These changes in channel geometry and substrate influence the channel's sediment transport capacity.

The objective of the sediment transport analysis presented here is to show how an increase in sediment input to a reach changes the transport capacity and rate of deposition within that reach. A change in deposition rate of 50% above background deposition rates, as shown by the transport model, was selected as an allowable change in deposition due to management activities.

4.1. Reach Selection and Characteristics

March 18 Jan 1984 Trains

The Middle Fork Payette River was broken up into seven reaches. The partitioning of the reaches selected was based on stream slope similarity and significant tributary sediment sources. The reaches were numbered from the upper end of the Middle Fork Payette River (Reach 1) to the confluence with the South Fork Payette (Reach 7) (Figure 2).

Load capacities and allocations are established in the Middle Fork Payette River TMDL for the contributing areas to the lowest three reaches (5, 6, and 7). The contributing area for Reach 5 includes the entire sub-basin area upslope and upstream of a point just downstream of the confluence between Lightning Creek and Middle Fork Payette River. The contributing area for Reach 6 includes the entire sub-basin area upslope and upstream of a point just upstream of the confluence between Anderson Creek and the Middle Fork Payette River. The contributing area for Reach 7 is the entire Middle Fork Payette sub-basin drainage.

Characteristics used in the transport capacity estimates are presented in Table 2. The channel geometry dimensions used for the two-year flow are based on measured cross-section data (IDEQa, 1998). The channel Manning's n was estimated using Cowen's method at each cross-section (Chow, 1959). The lengths and slopes of each reach were obtained from 7.5 minute, 1:24,000 USGS quadrangle maps. The drainage area for each reach was determined by adding up each of the upstream sub-watershed areas.

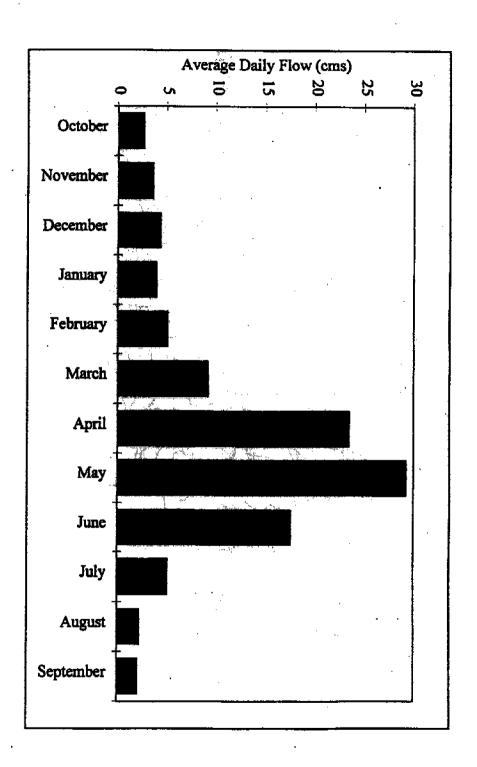


Figure 1: Annual Hydrograph of the Middle Fork Payette River

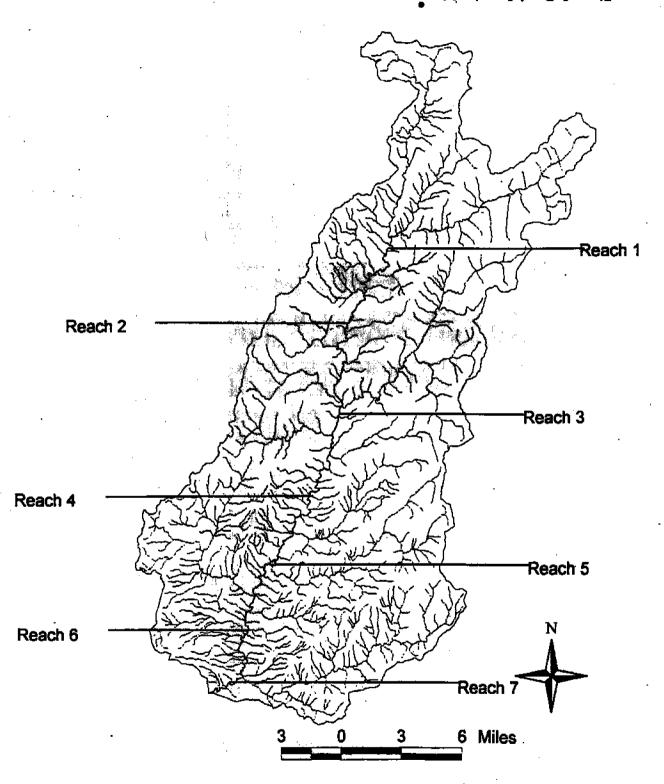


Table 2: Reach Characteristics

	w	WP	À	R	L	Slope	n	A _{dr}	Q ₂	Sub-Watershed
Reach	(m)	(m)	(mi²)		(km)			(Ha)	(cms)	· ·
RI	16	16.9	10.4	0.62	12.9	0.0101	0.066	1.98	13.2	UP, B, N-BB
R2	16	16.3	11.5	0.71	10.5	0.0065	0.060	2.33	16.2	S-BB
R3	22	22.4	19.6	0.88	13,3	0.0087	0.055	4.40	36.7	SV. SX
R4	33	33.3	19.1	0.57	9.7	0.0168	0.035	4.67	39.7	RT, N-RC
R5	25	26.1	32.2	1.23	7.2	0.0031	0.035	6.35	58.6	BD, LT, S-RC
R6	38	39.4	70.5	1.79	8.8	0.0010	0.035	8.03	79.2	SC, PY
R7	27	28.2	47.5	1.68	3.7	0.0010	0.027	8.83	89.4	AN

W = Width; WP = Wetted Perimeter; A = Cross-Sectional Area; R = Hydraulic Radius; L = Length;

4.2. Reach Sediment Transport Capacity

4.2.1 Method and Inputs

An analysis of reach transport capacity was conducted using current reach geometry characteristics and background sediment levels. These background sediment levels were then increased until the rate of deposition within each reach was 50% above background deposition rates. Sediment transport for bedload used Parker's equation for uniform mobility for each particle size class (Parker, 1990; Kinerson, 1986; Wilcock et al, 1996; Andrews and Nankervis, 1995).

Table 1 presents the amount of background hillslope erosion estimated to enter the Middle Fork Payette River (see Amount Delivered, Table 1). These average annual sediment inputs were partitioned into particle size classes based on the Soil Survey of the Middle Fork Payette River Basin (USDA, 1976).

Beginning in the uppermost reach (Reach 1), background sediment input was totaled for each of the contributing sub-watersheds and routed through the reach. Those sediments that were shown to be output at the bottom of the first reach were then routed to the second reach as primary input. Tributary background sediment input from the contributing sub-watershed were then added to the primary input within the second reach and routed to the third reach. This pattern (i.e., adding the sediment routed down from upper reaches to the tributary inputs from the nearby sub-watersheds, then routing the total down to the next reach) was continued down until the confluence with the South Fork Payette River. Sediment input from the sub-watersheds was then increased until the deposition rate within each reach was 50% above the deposition rate during background input levels.

Certain inputs and results of the sediment transport capacity model were checked for each reach in order to determine how well the inputs and model fit within the Middle Fork Payette River system. These included a check on the channel geometry during the two-year flow, and a check on the observed verses the predicted medium particle size (i.e., D50) for the reach. The results of these checks are presented in Table 3.

n = manning's n; A_d = Reach Drainage Area; Q₂ = Two-Year Streamflow; UP = Upper Payette; B = Bull; N-BB = North Bridge-Bryon; S-BB = South Bridge-Bryon; SV = Silver, SX = Sixmile; RT = Rattlesnake; N-RC = North Rocky Canyon; BD = Bulldog; LT = Lightning; S-RC = South Rocky Canyon; SC = Scriver; PY = Pyle; AN = Anderson

Table 3: Parker Transport Capacity Model Input and Reach Medium Size Particle Check

Reach	Two-Yr Flow (cfs) (Provided)*	Two-Yr Flow (cfs) (Predicted)**	Percent Difference in Flow (%)	Medium Particle Size (mm) (Observed)	Mediu Particl (Bkgrd)	m e Size (mm) (Target)	
Ri	13.2	11,5	-13	68	77	75	
R2	16.2	12.2	-25	68	54	52	
R3	36.7	30.5	-17	97	93	90	
R4	42.9	47.9	12	119	116	113	à.
R5	58.6	58.8	0	38	41	40 -	· **
R6	79.2	93.9	19	5	18	17	18.4
R7	89.4	79.2	-12	5	16	15	47

^{*}Based on Fitzgerald, 1998b

4.2.2. Model Application and Assumptions

The Parker bedload equation is used in the Middle Fork Payette River TMDL loading analysis to develop an allowable rate of deposition above background. This model is an empirical model developed on streams with gravel substrates. Validation studies of the Parker model have been conducted in the Seirra batholith streams (Andrews and Nankervis, 1995). Because the Middle Fork Payette River is dominated by gravel size substrate in the lower reaches (i.e., D50 = 5 mm diameter) the Parker equation was determined to be appropriate. Assumptions used in the current application are as follows:

- Steady and uniform flow conditions at bankfull stage represents the two year (i.e., channel forming) flow.
- Channel roughness, slope, and geometry are uniform along each of the designated reaches.
- The sediment particle size distribution entering the tributaries and the Middle Fork Payette River is uniform throughout the sub-basin.

4.2.3. Reach Transport Capacity Results

Table 4 summarizes the results of these transport capacity estimates and converts the sediment input to the Middle Fork Payette River into the target erosion rate from hillslope management activities. Table 5 lists the management target input in "percent above background" and "tonnes per year" for each Subwatershed.

^{**}Based on the Manning's Equation for the Q₂ channel cross-section (Richards, 1982; IDEQa, 1998).

Table 4: Sediment Input Rate Results by Reach

	Background Anput Entering	Rate of	of Live III	Capacity #.2	Cumulative *Load Capacity*
Reach		Deposition (tonnes/yr)	in the formation with the sign	(% Above (Background)	(% Above (Background)
R1 R2 R3 R4	71 10 53	4.2 3.0 2.3 0.8	4.5	50 44 49 50	50 ************************************
R5 R6 R7	69 55 68	16.2 35.8 29.5	24.3 53.7	56 26 48	50 16 47

^{*}Based on increases to BoiSed background amounts delivered to each stream reach.

Table 5: Load Capacity, MOS, and Management Targets

	Cumulative	Cumulative	Cumulative	Cumulative	Cumulative	Cumulative
. "	Load Capacity	Load	Background	Margin of	Management	Management
	(% above	Capacity	Load	Safety =	Allocation	Allocation (%
Reach	background)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yt)	above bkgrd)
RI	50	4624	3083	462	1079	35
R2	48	5600	3761	560	1279	34
R3	47	10164	6888	1016	2260	33
<u>R4</u>	48	11867	8002	1187	2678	33
R5	50	13391	8978	1339	3074	.34
R6	46	15076	10317	1508	3251	32
R7	47	16806	11470	1681	3655	32

4.3 Current Load Due to Management Estimates

Estimates for hillslope sediment levels due to management activities and the increase over background due to management related activities can be made using a variety of models. Two of these include the draft SedMod (Boise Cascade, 1998) and BoiSed (Reining, et al, 1991). Neither of these two examine the effects of management activities on landslides, or incorporate increases to sediment loads due to fire, range, agriculture, or urban activities. Also, the estimates provided by these models are based on current sediment sources during average climatic conditions and, therefore, do not provide estimates of the current load being routed by the stream. The current sediment load estimates for both SedMod and BoiSed are presented in Tables 6, 7, 8, and 9.

Table 6: SedMod Percent Above Background*

	Managemen	t 🏄 💮 Bac	kground	Percent	
Sub-Watershed *	* (tonnes/yr, t	ons/yr) (ton	nes/yr: tons/	yr) (Above l	Background (%)
Upper Payette	.∞170.3; 187.7	240	.9; 265.5		71
Bull	-1.4; 1.5	The second of th	.3; 393.9		0.4
Bridge-Bryon	213.9, 235.8	930.4	.0; 438.7		54
Silver	151.5; 167.0	1. 15 TH - 0.00 HUTE	.3; 426.9		39
Sixmile	562.0; 619.5	01 SANS BRIGHT CO.	4; 424.8		146
Rattlesnake	66.7; 73.5	1 (Carlotte	i; 108.7		68
Rocky Canyon Bulldog	342.8; 377.9 0.0; 0.0	V 885 985 0 985 0 8	6; 481.3 5; 236.4		79 0
Lightning	29.1; 32.1	A 1 DANY, 2500 / 1 DAY 251	9; 369.2		9
Scriver	446.2; 491.9	451.	6; 497.8		99
Pyle	579.8; 639.1	550.	6; 606.9		105
Anderson	<u> </u>	533.	2; 587.8 🦈 🤊		57

^{*}Based on road surface erosion (management) and hillslope creep (background) only. Landslide inputs are not considered in this estimate.

Table 7: SedMod Percent Above Background Results by Reach

Reac	1. 1/1. 10 (4. 10. 10. 10. 10. 10. 10. 10. 10. 10. 10	Management (tonnes/yr)	1020 B. 107 COMPANY CONTROL (1980)	Percent Above C) Above Backgrou	umulative Percent
RI		278.7	797.2	35	35
R2		107	199	54	39
R3		713.7	772.7	92	62
R4		238.1	316.9	75	64
R5		200.5	767.7	26	54
R6		1026	1002.2	102	67
R7		303.7	533.2	57	65

Table 8: BoiSed Percent Above Background*

Marie Cont. Cont.	Management Background BoiSed Percent
Sub-Watershed	(tonnes/yr; tons/yr) (tonnes/yr; tons/yr) Above Background (%)
Upper Payette	159.9: 176.3 823.8; 908.1 19.4
Bull	5.2; 5.7 706.4; 778.7 0.7
Bridge-Bryon	229.0; 252.4 1038.3; 1144.5 22.1
Silver	120.9; 133.3 1110.0; 1223.6 10.9
Sixmile	1044.7; 1151.6 1809.3; 1994.4 57.7
Rattlesnake	35.7; 39.3 344.7; 380.0 10.3
Rocky Canyon	117.5; 129.5 831.9; 917.0 14.1
Bulldog	3.6; 3.9 517.4; 570.3 - 0.7
Lightning	94.4; 104.1 801.0; 882,9 11.8
Scriver,	373.9; 412.f. 864.1; 952.5 43.3
Pyle	164.8; 181.7 435.6; 480.2 37.8
Anderson	323.6; \$77.2 1283.9; 1415.3 1 40.8 40.8 1 40.8 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

^{*}Current sediment loads from USDA Forest Service managed lands only, Gravel and dirt roads grouped together.

Table 9: BoiSed Percent Above Background Results by Reach

Rea	Management ch (tons/yr)	Background (tons/yr)			tive Percent Background	(%)
R1 R2 R3	308.2 126.2 1284.9	2258.5 572.3 3218.0	14 22 40		14 15 28	
<u>R4</u>		838.5	12		26	
R5 R6		1911.7 1432.7	41	·	23 25	
<u>R7</u>	577.2	1415.3	41		27	

In addition to these modeled results, a geomorphic risk assessment for sediment has also been conducted within the Middle Fork Payette River (Fitzgerald et al, 1998a). This assessment identified those subwatersheds most likely to contain the largest amount of deliverable sediment. Sub-watersheds with high natural (i.e., background) sediment yields are Lightning, Big Bulldog and Groundhog. Pure subwatersheds that are likely to deliver the largest anthropogenic sediment loads to the Middle Fork Payette River include: Anderson; Scriver; Lightning; Sixmile; West Fork; and Wet Foot. Composite subwatersheds that have substantial anthropogenic sediment yields are: Pyle; Rocky Canyon; Bridge; and Groundhog. The geomorphic risk assessment also identifies those watersheds with a high risk for internal sediment problems due to anthropogenic sources. These watersheds include: Anderson; Scriver; Lightning; Sixmile; West Fork; Wet Foot; and Silver.

A cooperative sediment trend monitoring study with the EPA, IDEQ, and the USDA Forest Service is currently being conducted within the Middle Fork Payette River sub-basin. The results of this effort are

helpful in quantifying streamflow and captured bedload particle sizes within the Middle Fork Payette River sub-basin. The draft report covering the 1998 data collection season presents bedload: discharge rating curves for two sites in the lower reaches of the Middle Fork Payette River based on 11 bedload samples. Estimates of the sediment load during the spring runoff period (late April through June) at these two sites indicate a load of 57.5 tons/mi² at the confluence with Lightning Creek and 88.5 tons/mi² at the site hear the mouth. Note that these data show an estimated increase in bedload sediment production as the length of flow within the alluvial portion of the sub-basin increases, a condition highly unlikely in an agrading river system. Due to the preliminary nature of these values they were not used to validate the current sediment load as estimated by SedMod.

Table 10: Current Cumulative Sediment Loads, Cumulative Management Allocations, and Required Sediment Load Reductions*

Rea	Cumulative Current Load Estimate (% ach above bkgmd)	Cumulative Management Allocation (% (above bkgrnd)	Required Sediment Load Reduction (% above bkgrnd)
R1	35	35	0
R2	39	34	5
R3	62	33	29
R4	64	33	31
R5	54	34	20
R6	7	32	35
R7	8	32	33

^{*}Current load estimate for percent above background based on SedMod (Boise Cascade, 1998).

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Transport capacity and reach deposition results for the seven reaches under background sediment input levels are presented in Table 11. Transport capacity and reach deposition results for the seven reaches under target sediment input levels are presented in Table 12.

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Table 11s Reach 1 Transport Capacity Ender Background Condition

		ORONOTEY CHECK			
n EACST HYDRAULIC BEREATH AND CYNYFANTH Chunnel Width - * (m)	16	Menunger 0.066	Inspet Particle Sales -	Personage Tonace	_ 1
Slope - S (m/m)	0.0301	Flow (cane)	(man) (man)	(ma)	" . •
Wotted Personetes - P (m)	169	Adr (m*7) 76.5	1 1 2 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	× 414 9 21	
Cross Section Aten to WS - A (m*2) Hydroulic Rudou - R (m)	10-4 0-67	Pleas (amr) Personal Difference -0.13	0.5	5.21 3.116 3.000	
Death of Secret ~ 10 R	0.21			13% 9.25 31% 9.25	Sec. 15
Acceleration of Oravity - a (m/+2)	9.81	T 100 - 100	2 4	316% II.34	1일: 보험다 - 12:41 - 12:42 - 13:51:11
Demany of Water - the (kg/m*1)	(000 61.0	TRANSPORT TOTAL VALUE OF		10% 719	1971 19
Hed Shout Street - th (Pe) United by G. Schwarz - phon (kg/m²3)	2700	Adr (m/*1) 76 1 Biggind (T/mi*2) 80 0	7 16 14 32	136	
Shout Velocity (1)"t)(m/t)	0.09877	Manual (Ne oby Blue 2014	32 4	333 34 335	
Mediae Grain Size-450 (mps)	77	Manif (Ther'2)	64	2% 142	
Percent of Bed < 1.4 mm	10%	Heckenwel (1) (1)	(2g 254	34 142	
Percent of 300 < 1.0 mm	14%	Management (*** *** g **	256 517	3% 1.62	
Percent of Bed < 11 mm	17%		` \	100%	
	wa with		•		
PARKER EQUATION TOTAL BETLOAD TRANSPORT		Wandan ab medie	: 	For 2 year elocus	Aug. Company (Aug.
(*median (demicas)	t"r median : pla produs (dimlere) (dimlere)	(denjiere) (m°2/s)	**************************************	Uksobi	ELPS x = yS
4 768,01	3.76E-02 1.20479	0.03402 5.868-4		(Tunime/yr)	
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REACH BIZE CLASS TRANSPORT CALCULATIONS			4 S S S S S S S S S S S S S S S S S S S		
Maratoure Gran	Maximum Codenstric Grain Mean	TARGET A	Parker	Parker Parker	fetential Parecle
Sun	Size of Greek		Poincile Mercurent	Particle Potente Velicoty Volume	A Section 1
en Fraction	m Fraction Size in Fract				Qin Velocity Suspended? Ola(vel)*draw W/
(mm)	(mm) (mm)		d a (m*2/s)	(m/hr) ab/** (m/	3/n) (00/n) (0/n) (Wr > 1/n/n)
0.173	0.25 0.3 0.5 0.4 »	E 97E-8) 37F366 1 79E-04 266.288	1.18+01 (808.6)	176.714 1.54E-0	623.56 0.014 Yes
03	07) 546-04 (175.001 1.572.4 172.596 1.548.4	# 1 ab 2 - 5 am a mar 1 ab 1 a
Line Company of the C	FR 1	7.08E-04 57.12k	1.1E+01 9.57E-03		V Stranger Company (1889)
2	4 18 17 17 17 17 17 17 17 17 17 17 17 17 17	1418-45 13.700 1818-05 (* 1892)	1 (1240) \$ 058-6)	138 792 1.428-4	
	" 17 16 II	1812-03 (* 16.921 3 602-03 (* 496.)		141,000 1,338-0	l 0251 No
16 ************************************	32 3	1.1 (E-02 4.26 6	4.3E+00 1.86E-0)	112 160 1 00E-0 67 727 4 66E-0	736
12	64 45	3.22 2-0 3 4142	1.3E+00 1.14E-03	20.085 1.80E-4	
64 28	128 9 256 181	4.438-02 3.075 8.818-02 5.540	6.98-0) 6.248-06	0.110 9.50E-0	5 9.26 (CO) No
178 756	312 362	1818-02 0.340 1778-01 1.271	5.12-07 4.000-10 5.00-10 5.118-13	0000 7.23B-0	9 0.00 1 (19) No
				2 900 a 116-1	2 0.00 2.006 No
Geometrie (†) Mota		AN I			
o Greet	Promay Tributary	Parker Parker Relative Potential			A h of Bul
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3670	1	Tonkisia .	* 0 <u> 14</u>	0.000 3.168-0	
		Total 1613	Company	% Cop Upod 21% Same - 1.51	
and the second of the second o	=			<i>,</i> 17 €	D50 76 I gas

N3

Table 11b. Reach 2 Transport Capacity Under Background Conditions

REACH HYDRAILEC RESILES AND CONSTANTS Channel Width - w (m) Slope - S (m/m) Wetted Perineter - P (m) Croes Servine Area to WS - A (m² 2). Hydraulic Redius - R (m) Dapth of Scour = 1/3 R Acceleration of Gravity - g (m/r² 2). Bed Shvar Strees - th (Ps) Detaily of Sediment - rhos (kg/m² 3). Sheas Valooiny (U*S)(m/s) Median Grant Size - 450 (m/s) Percent of Bed < 1.4 mm Percent of Bed < 2.8 mea.	16 9.0063 16.3 11.3 0.7\$ 0.24 9.81 1000 45.0 2700 0.08484 34 9%		OROSERTAY CHECK Menenings a Plow (case) Plow (case) Plow (case) Plow (case) Plow (case) Plow (case) 16.2 Percent Different 0.25 TRIBUTARY NAVIT TO REACH Ade (not'2) 13.5 At Biggrad (T/min'2) Nagast (% ube Bing 0.98 Mgsel (T/enin'2) Dackground Muragrament 0.	nget Particle Size min (num) (123) (123) (123) (123) (124) (124) (125) (125) (126) (Atta. (seen) 0.25 0.5 1 2 4 8 16 32 4 22 236 312	Percentage (sum) 13.09% 13.09% 13.00% 13.00% 10.00% 10.00% 5.00% 5.00% 2.00% 2.00% 2.00%	Toursee'ye 1.30 1.30 1.50 1.60 1.60 0.50 0.50 0.50 0.70				100
Percent of Beek < 15 min FARKER EQUATION TOTAL BEEK GAD TRANSPO ("median (dimber) 4.972-02 REACH SIZE CLASS TRANSPORT CALCULATION Minimum Christo Size in Precion (me) 0.125 0.25 0.5 1 2 4 8 10 32 64 128	A'r medina (dintess) 3,768-02 Maximum Chain Sign in Fraction (mm) 0.23 0.5 1	phi_median (dissipant) 1.32126 Occumentic Mean of Crain Size in Fraction (next) 0.2 0.4 0.7 (.4 2.8 5.7 11 23 45 91 181	1.278-04 392.137 2.528-04 196.886 5.038-04 98.253 1.002-03 49.632 1.992-03 24.920 1.978-03 6.282 7.918-03 6.282 1.588-02 3.154 3.148-02 2.384 6.258-02 0.799		Qb total (bath) 2.298400 Puctor: Potential Morroment: per unit with: \$\dot{100}\$ 6.388-03 6.288-03 6.288-03 4.288-03 4.288-03 4.288-03 4.288-03 4.18-04 5.288-03 9.028-12	For 2 year storm (% local (Tournetys) 187 France Puriode Velocity 18 (e./le) 97.174 95.267 94.479 90.994 84.333 72.231 52.189 25.210 3.682 0.883 0.000	Parket Potential Volume Qia 'w (m 1/o) 1.028-01 1.018-01 1.018-02 9.978-02 7.608-02 7.608-02 3.808-03 3.808-03 1.908-07 (1.908-01	(ke/s) 275,95 7	Ws	Pacticle Compared of Year Year No No No No No No No	
256 Groupetric Mean of Grain Size in Praction (non) 0,2 0,4 0,7 1,4 2,8 5,7 11,3 22,6 45,3 90,5 181,0 362,0	Printery Import (Tonesevyz) 9 9 9 11 7 6 4 4 0 0	(Tomers/yr)	2.483-01 0.200 Parker Perker Robitive Robertive Moreament (Kate) (Tounes-fr) Supposeded Supposeded 248 44 238 42 240 399 3 205 34 141 24 72 12 10 2 10 0 0 0 0 0 0 Total 2202	7.85-11 Cutput (Tonam/y) 11 11 11 13 8 5 4 2 0 0	Deposited (Temperature) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Bedford (toronary) Surpanded (\$2.530 10.530 10.530 12.960 4.050 4.050 1.721 0.000 0.000	7.16E-13 mass/velocity	9.00 Protes Particles In Motion Suspende 4% 4% 6% 18% 18% 18%	2.006 brainty 35 In Bed 0% 0% 15% 15% 22% 29% 46% 87% 100%	Approx. D50	

Table 11c Reach 3 Transport Capacity Under Background Conditions

				GROMETTRY CHECK	· fi	aput Particle !	tion.			1		
REACH HYDRAULIC RESILLIE AND CONSTANTS Channel Width (m (m) 27%		22		Marshay's x	0.055	milit Marie E Marie .	Ning.	Pencerana.	Tonses'yr			
Slope · S (m/m)	0.0	0874	No. 1	Flow (cme)	30.5	(mm)	(mm)	(mm)				
Wetted Perimeter - P (m)		22.4		Adr (m*2)	170	0.125	0.25	13.00%	6.29	J253	•	
Cross Section Asses to WS - A (m'2)	33	19.6	J.	Flow (tms)	36.7	9.25	0.5	13.00%	6.29			
Hydranic Radius - R (m)	. Ida	0.88		Percent Difference	-9.17	0.3		13,00%	6.89	*	:	
Depth of Scott = 1/3 B		0.29	*,·,22	100		- 1	* 2	17.00%	1g (5.99	¥		
Acceleration of Gravity - s (m/s*2)		9.81		TREUTARY NEVT	الشيد	<5.2 mg/s 2 mg/	4	16.00%	3.49		•	
Density of Water - the (kg/m^3)	(0)Y V	1000 75.0	4.5	~ A& (=!^!) ->	10 ALACE	- 1	16	10.00%	3.30 3.12	[· ''		
Bed Show Street - th (Fe)	Page 1	2700		District T/m//2	0.7	16	32	3.00%	2.65	300g	- 5	
Density of Sediment - then (kg/m ⁻³) Shear Velocity (U*k)(m/e)		0956	1	Mant (% sty Hig				3.00%	9 1.65	50Y	aN .	
Middle Grain Sire -d50 (mm)	0.1	13	15	Mart (T/ml/2)	.00	32 64	128	2.00%	L.06	1	ga in the	
Tercent of Bed <).4 max	14 18 1 3 13 13 13 13 13 13 13 13 13 13 13 13 13	° 1%		" Bediground	- 33	120	256	2.00%	1.06			
Percent of Bed < 1.5 mm	**************************************	9%		Management	es	254	512	2.00%	1.06			
Percent of Bed < 5.7 mm	30000	13%						100.00%		1		
Percent of Bed < 11 mm	7E	16%										
	*.			2.0	-			W				
PARKER BOUATRON TOTAL BETTLOAD TRANSPORT		-1		W*median	ob profiles	Ob total	Qb total	For 2 year store	1			
(*median	(dinden)		ki_median (dimlem)	(Seeless)	(m/2/r)	(m/3/s)	(ku/n)	(Cotuntarys)	,			
(dimires)	3.76E-02		1,29314	0.07233	6.51E-05	0.00	5.278+00	- 455	- ,	F1 -		
4,86E-02	3.000-va		1/07314		4	4000		282	<i>e</i>			
REACH SIZE CLASS TRANSFORT CALCULATIONS	- 1 - 4% ×			AZ A		19.0	, e		•	4.		
Minimum	Maximum		Jeometrie			a iya	Perior	Perker	Purker	Potential	Perticle	
Grein	Chroim		Mese		2.3%	».	Polential	Particle	Potential	Mane	7di	Particle
Size	Size		of Circin	N. N. V. S. S. SAGER	phi		Maramint	Valority	Volume	QNi	Velocity	Suspended?
in Praction	in Praction	Sin	in Prectio	a 1" ich frentien	iO: Baction	W٩	por task width	™ Vf	Qhi	hi(mi) h	We	•
(rate)	(mm)		(mm)		-		10 (4.7/1)	(m/h/)	qbi *= (m*3/e)	(kath)	(m/t)	(We > UM(1)
0.125	0.25		0:2	7.468-03	651,846	1.)#+01	1,178.02	169,344	1.0(2.0)	#1 (7.0	4.044	. Yw
0.75	0.5	:•	0.4 0.7	1.09E-04 × 2.96E-04	164.323 164.323	1.12+07 1.12+01	1.166.02 1.156.02	168.416	2.595-01	\$16.E2	4.043	Y.
			1.4	3 00E-04	82.504	1.1240L	1.33B-02	166.532 	2.93E-01 2.89E-01	797.19 780.03	9.009	Yer
2.89%	- 72.5 2 - 32.4		23	1.178-03	41.424	1.08+0L	L.26E-02	155,642	2.768-01	745.62	0.125 0.177	· zi No No
4			3.7	1.34E-03	20.798	9.36+00	L.63B-02	142.066	2.37E-01	680.59	0.177	No No
	16		11	4.66E-03	10.442	7.7B+Q0	9.34B-03	£17.779	2.09E-01	564.23	0.355	₩
16	. 32		23	9.278-03	5.243	5.25+00	6.41B-03	79,073	L.40E-OL	378.81	0.502	No
32	. 64		45	1.85%-02	2.632	2.JB+00	2.56B-03	3L.601	5.61E-02	132.39	0.709	No
64 9	L28		91	3.688-02	90 g 1.322	9.28-02	1.148-04	1.402	1.49E-03	6.72	1.003	No
128	256	7. A.	181	7.33E-02	9.654	7.4E-06	9.00E-09	0.000	1.998-07	0.00	1.419	No
256	512		362	1.468-01	0.333	3.16-09	3.84%-(2	0.000	8.41E-11	9.90	2.006	Мo
								*				
Geometric Mean				Parker	Perker			14.0		AL P.S. A		
of Grein	Princery	nager i	Tributary .	Relative	Potential			10		% of Bed		
Size in Fraction	Input	1700) 180	Input	Movement	Movement	Output	Deposited	Bedlosd	Many/valority		Canadative	
(mm)	(Touget/yr)		Tonnes/yr)	(Kg/s)	(Tunnes/yr)	(Tomare)ye)		(kinanen/yr)	OV/A	n Melion	% in Bed	Approx D50
0.2	11	, i e :	7	. أناب وسال	Suspended	, 17	:: <u>0</u>	Jupandel	Superded	Dayman.	0%	
0.4	11	right Militar	7	Symposical	Superior	17	Ō	Supersed	Superied	الملحسنية	0%	
0.7	H	•	7	Supposed	Surpreded	: 17	** D	Ampreided	Surpended	Seconded	0%	4 L
11	11		7	780	lo7	j 7	; ye Q	#17.420	1.328-05	4%	496	
2.B	13		•	746	104	. 21		21.440	1.57 E-8 5	5%	314	
	5 ·	1	3.	41	94 78	. J3	20	13.400	1.00E-05	4%	13%	
11.3	3 '	. **	3	564 379	32	1	} •	3.040	7.798-06	3%	16%	1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
22.6 45.3		1.	3	951	21 21		D.	6.700	9.67E-06	3%	19%	
90 5		****	ī	7				4.371 0.495	2:505-05 7:538-05	िं 1% । े 23%	24%	a'
(2) 0	ă.	11 6 m 11 m		0.00		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		0.000	7.538-05	23%	49% 75%	.92.5
362.0	ō	170.5	i	•	•	• •	i	4.000	7.53E-05	25%	100%	
				Total 3307		800	Tel- 23	% Con Unit 18			****	
					77		4.No. 7 7 7					915

. . .

Table 11d Reach & Transport Capacity Under Background Conditions

33 Q.01618 33.3 19.1 0.57 0.19 9.81 1000 91.0 2700 0.12069 114 154 154 166-62		GROAGEON Y CRIRICA Manusing's II Flow (crits) Add (m*2) Plow (crits) Parcond Difference TRENTARY ROPUS I Add (mir'2) Blagged Thrid's Magnet (Ne sive Blag Magnet (Frind's) Beckground Management	0.035 47.9 192 42.9 0.12 0.12 0.12 0.12 0.00 11 0.00	mpet Pachole 65 min (mm) (nm) 0.123 0.23 0.3 1 2 4 8 16 32 64 122 236	max (mm) 0.25 0.5 1 2 4 8 16 32 64 123 256 512	Farcastage (8000) 13.0094 13.0094 13.0094 13.0094 14.0094 14.0094 14.0094 14.0094 14.0094 14.0094 14.0094 14.0094	7		では、	3
0.01618 333 19.1 0.57 0.19 9.81 1000 91.0 2700 0.12069 1154 1594 1594	phi_medius (danies)	Mareing's n Flow (orts) Plow (otts) Paronel Difference TRIMITARY REPUT 1 Adv (mir'2) Higged Timit'2 Nigest (N alve Bing Marein (Trimit'2) Background Managarungt	0.035 47.9 192 42.9 0.12 0.12 0.12 0.12 0.00 11 0.00	min (mm) 0.125 0.25 0.3 1 2 4 8 16 532	(mm) D.25 O.5 I I I I I I I I I I I I I I I I I I I	(mm) 13.00% 13.00% 13.00% (5.00% (6.00% (6.00% (6.00% (5.00% (6.0	2.70 2.70 2.70 2.75 3.35 2.06 1.22 1.04 1.04 1.04 0.42			
0.01618 333 19.1 0.57 0.19 9.81 1000 91.0 2700 0.12069 1154 1594 1594	phi_modium (4m-tes)	Flow (orts) Ads (ort2) Flow (sins) Faccast Difference TRIBUTARY SEPTIT 1 Ads (off 2) Higned Trint*2 Higned Trint*2 Higned Trint*2 Higned Trint*3 Higned Trin	47.9 192 42.9 0.12 0.12 0.12 0.12 0.13 0.00 21 0.00	(nam) 0.123 0.23 0.3 1 2 4 8 16 32	(mm) 0.25 0.5 1 2 4 8 16 32 64 128	(mm) 13.00% 13.00% 13.00% (5.00% (6.00% (6.00% (6.00% (5.00% (6.0	2.70 2.70 2.70 2.75 3.35 2.06 1.22 1.04 1.04 1.04 0.42			
33.3 19.1 0.57 0.19 9.81 10000 91.0 2700 0.12069 116 5% 11% 15%	phi_modius (4m-text)	Ada (m*2) Plow (nin) Percent Difference TRENTARY REPUT: 1 Adv (m*2) Blagnet Trent*2 Mgmat (Trent*2) Mgmat (Trent*2) Beckground Managamunt	192 42.9 0.12 0.12 0.12 0.00 0.00 0.00 0.00	0,123 0,25 0,3 1 2 4 8 16 52	0.25 0.5 1 2 4 8 16 32 64	13.00% 13.00% 13.00% 13.00% 14.00% 15.00% 15.00% 15.00% 15.00% 15.00% 15.00%	2.70 2.70 2.76 3.35 2.08 1.29 1.04 1.04 0.42			
19.1 0.57 0.19 9.81 1000 91.0 2700 0.12669 116- 5% 11% 15%	phi_modius (danies)	Plow (can) Percent Difference TREWTARY REPUT I Add (mir'2) Skyrot Thm'2 Signet (Ne aby Big Myrat (Frid'2) Beckground Managarway)	42.9 0.12 0.12 11 1.9 0.0 31 9	0.25 0.5 1 2 4 8 16 32	0.5 L 2 4 8 16 39 25 256	13.00% 13.00% (3.00% (4.00% (4.00% (4.00% 5.00% 2.00% 2.00%	2.70 2.70 2.76 3.35 2.08 1.29 1.04 1.04 0.42			
0.37 0.19 9.81 1000 91.0 2700 0.17069 116 534 1194 1594	phi_modium (4m-tes)	Percent Difference TRENTARY SEPIT 1 Ade (nd*2) Edgest Timt*2 Edgest Timt*2 Edgest Civit*2 Beckground Mana Civit*2 Edgest Civit	O.12 O.NIACH II L.9 CM O.0 2 2	0.3 1 2 4 8 16 32 64	1 2 4 8 16 32 64 133	13.00% (3.00% (4	2.70 2.79 3.35 2.08 1.25 1.04 0.42			
0.19 9.81 1000 91.0 91.0 2700 0.17069 114 594 1194 1594	phi_modius (dimissis)	TRIBUTARY MOPUT: I Ade (not'2) Blagand Trint'2 Magnet (No alor Blag Magnet (Trint'2) Beckground Managamund	ONEACH II I.9 Con 0.0 21	[2 4 8 16 32 64	93 64 128 256	(3.00% (4.00% (3.00% (5.00% (5.00% (5.00% (5.00% (5.00% (5.00% (5.00%	2.70 3.35 2.00 1.25 1.64 1.04 0.42			
9.81 1000 91.0 2700 0.17069 116 574 1174 1574 1894	phi_modius (dimissis)	TREATANT REPORT I Adr (mir'2) Blagmed Timir'2 Mignat (Timir'3) Mignat (Timir'3) Beckground Managamund	ORFACE II LO ORF O.O II O	2 4 8 16 32 64	93 64 128 256	16.00% (8.00% 6.00% 5.00% 2.00% 2.00% 2.00%	3.35 2.08 1.25 1.64 1.64 0.42			
9.60 91.0 91.0 2700 0.12069 115 5% 11% 15% 18%	phi_modius (dimissis)	TREATANT REPORT I Adr (mir'2) Blagmed Timir'2 Mignat (Timir'3) Mignat (Timir'3) Beckground Managamund	11 1.9 000 11 0	4 8 16 32 64	93 64 128 256	(500% (500% 500% 500% 200% 200% 200%	2.08 1.23 1.64 1.64 0.42			
91.0 2700 0.12069 115 534 1154 1594	phi_modius (dimissis)	Adr (mi*2) Biggod 'Pini*2 Signet (16 ale: Big Mgret (1/mi*2) Beckground Management	11 1.9 000 11 0	16 32 64	93 64 128 256	5 00% 5 00% 5 00% 2 00% 2 00% 2 00%	1.25 1.04 1.04 0.42 0.42			
2700 0.17069 316 5% 11% 15% 15%	phi_modius (dimissis)	Rigand Timi*2 Mgont (No aby Bing Mgont (Firefile) Beckground Managarant	0.0 0.0 21 0	(6 32 64	93 64 128 256	5 00% 5 00% 2 00% 2 00% 2 00%	1.04 1.04 0.42 0.42			
0.17069 316 574 1174 1574 1874	phi_modius (dimissis)	Mgrat (N alv Bla Mgrat (T/m/3) Beckground Managerrunt	000 0.0 11 0	32 64 \s 124 \s	64 128 256	\$ 00% 2.00% 2.00% 2.00%	1.04 0.42 0.42			
116 5% 11% 15% 18% median indees)	phi_modius (dimissis)	Mgmt (7/m/3) Beckground Management	0.0 21 0	64 125	128 254	2.00% 2.00% 2.00%	0.42 0.42	24 (F (S (T		
5% 11% 15% 18% 18%	phi_modius (dimissis)	Background Managamunk	* [124	256	2.00% 2.00%	0.42	* 317		
15% 18% median median	(d iss)ces)	Managamunt	9[2.00%		٠.	8.1567	\$
15% 18% median median	(d iss)ces)			256	512		0.42			
medius	(d iss)ces)					100.00%		' '		
median.	(d iss)ces)	-								
medien	(d iss)ces)	~~	1,4,8							
medium. imless)	(d iss)ces)	w • #	4.3							
raless)	(d iss)ces)					For 2 year store.	* *:	**		
raless)	(d iss)ces)		4 m di	Qb total	Qfs.testal	Qh tetal		-		
		(dintent	(m*2/s)	(m/3/4)	(Nafe)	(Totales (ex)	s F. F.		- 1	
10R-01		0.05047	8,318,05	0.00	7.418400	640	•			a file Joseph A
		O'DISON S	6.3107.03	U.A.		1,47	A		1.7	200
		net Your		W 196 . 21L		48.00	wyler -	بأسد	1,000	
			3,2	250		1.71 (4.71 %)	2 2 4 6	- 55	2 355	2.7
painum.	Geometric				Perker	Pulker	Parker	Potentia)	Purticle	*
Jirosa	Mone	4 4 3 3 3 5 6 7 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			Potential .	Purticle	Potential	Mine	P.H	Particle
Size	of Circum		phi		Movement	Valority	Volume .	Qu.		Super, 64?
Fraction	Size in Fractica	t't ith Rection	all fraction	WT	per west which	Vi	QN.	Pr(AAD, PP	We	,
(min)	(mm)	5 7 7 T			ghi (m/2/s)	(m/lin)	dei a (m. 174)	(da/h)	(m/h) 📑	(Wr > U"(7)
0.25	0.1	5.97B-05	789,963	1.1E+01 /	1.448-02	M\$.761	£MEQ:	1635.66	0.014	Yes
0.5	0.4	1,192-04	306.029	- 1'1B+01	LIGR-OT	346.40	5.03E-0)	1628.46	4.063@h	Yes
1	9.7	2.37E-84	199.141	1.12+01	1.012.03	340.963	5.90B-01	1613.49	0.009	Yes
2	2 1.4 8 XX	4.71E-04	99.985	1.[X+0]	1,756.42	33-0.701	3.878-QL	1543.00	0.125	No West
. €:	2.8	9.39E-04	50.201	1.02+01	1.718-02	322.696	3.65B-01	1524.03		No
8	5.7°C/20°	1 87B-03	25.205	9.68+00	1.502-02	299.221	5.24E-01	[413.9L	0.256	No
16	11	3.72B-03	12.655	11.3E+00	1.36E-02	236,766	4.308-01	1215.01	0.355	No
32	23	7.428-03	6.354	6.0E+00	9.898-03	186.227	3.26B-01	001.22	9.502	Na
64	N. 45	1.40B-02	3,190	2.98+00	4.83E-03	90.003	1.59E-01	430.07	0.709	No
1128 (DECESSOR	91	2.94E-02	1.602	6.5E-01	7.338-04	12,840				No.
	181	3 36E-02	0.804	1.15-04						No
										No.
							1-447-41	0.00	2.000	Prop.
				garage Marga	Dan Miller		العنوانين ماهد في مصيد		St. 7 4	
		Parties .	Parker **	40.000	, laboration of the second			44 -40-4		老的小女士
المستحدث	Twit-days								\$ 1. P	
	3.5			54" 		122				사람들이 그 생활
										Approx
	(1444,44)									D30
	1				Alberta Shore	Section		Suppose .		5.95. 11.14
						a management	Superdel	Superio.	016	Waste Die
1_							a Bermadyd "	Sheprede	* O% S+	
-17 🦂) 		Contraction of the Contraction o	20		29.124	6.36E-05	3%	- 5% %	
						24.768	#.77E-06	- 6 4	1136	
	•	1416	- I27	15	•	15.480	5.91E-06	45	15%	82) To 110
8	頭 ■ 11.35	1215	10#	9 🤾	(X)(4) 🏺 😽 🖂	9.288	4.138-06	1%		
7		19 1	79	A 8400	e 200	7,740	4.74E-06			高级混合
4 2	80 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	430	. 39	3 3 6 6	•					
- 1	1.1 TA 1	65	4	130			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			1360
0	. •	0			a ≥3	0.001				1.5#.D
0	0	6	D	Tid 🖥 🕬	gwegir 🚡 🗀					
·	=			. • • 1.235		227.77		. ,,,,,,,	10039	•
		COURT CETS			1007.44	- cit rac (34)				149.0
	128 256 512 26 27 28 27 28 28 27 28 27 27 27 27 27 28 38 7 4 10	128	128 91 2.548-02	128	128	128	128	128	128	128

Table II a Peach & Transport Coppoity Under Background Conditions

			ORIGINATINY CHRIST	(Fee	et Perticle &	Lane			İ.		
REACH HYDRAULIC RESULTS AND CONSTANTS	25		Maningo a	0.025	min	Max	Percentage	Tueses/st		-	
Charant Width - w (m)	0.00309		Plow (cess)	58.6	(man)	(mm)	(emin)				
Stope - 5 (m/m)	26.1		Adr (m*2)	245	0.125	0.25	13.00%	9.00	t		
Wetled Perimeter - P (m)	32.2		Flow (ome)	58.6	0.25	0.5	13.00%	9.00	Σ ₄ 8		
Cross Section Aces to WS - A (#2)	1.23		Percent Differenc	0.60	0.5	ı	13.0066	9.00	97		
Hydroutic Redius - R (m)	0.41		Her Weller		ï	ż	13.00%	9.00	t '		
Depth of Score = 1/3 R	9.81			1	2	4	16.00%	11.07			
Acceleration of Gravity - 8 (m/s/2)		A	TRIBUTARY PAPUT TO	REACH.	4		10:00%	6.92		•	
Denuity of Water - the (kg/m/)	1.4.7		Adr (mi*2)	53	Ď	le.	C00%	4.15		-	
Bed Show Street - th (Pa)	37.4 2700	I was to be	Blumd T/ml*2	ાં કે ી	16	32	5.00%	3.46	1		
Density of Sediment - thos (kg/m²))	1 A -113 E	100	Memt (% aby Bkg	0%	31	64	3.00%	3.46		•	
Shear Velocity (U"k)(m/s)			Marrit (T/mir 2)	00	64	128	1.00%	1.38	196 198		
Medius Gratu Siza -d50 (www)	17	2000	Background	69	126	256	1.00%	1.34	1000	**	Al land
Percent of Brd < 7.4 mm	4.454		Menugerumi	0.00	256	512	7.00%	[.38	7	:>-	*1939
Percent of Bod < 2.5 home	152373		Zonal State Communication	educado SA	-:-		100.00%		ì		
Percent of Bed « 5.7 mm.	STERNING.	* . ***		<u>`</u>					,		
Percent of Bet < [1 mm	12 July 23 34		그 설심하다	**************************************							
			i.e.				For 2 year storm				•
PARKER EQUATION TOTAL REPLEAD TRANSPOR	t'r median	ohi media n	W*median	ab madies	Ob total	Qh total	Ob total				
(*median	(dissless)	(dinless)	(dinder)	(19/72/0)	(m*3/e)	(ke/l/)	(Tominal'ys)				31 T
(dissless)		1.43572	0.20047	9.06B-03	0.00	6.162+90	537	•		v	3.4
1 40E-02	3.768.02	1.453.12	100 Co.	100	3.35	7, 1900, 300	-33 6		44.5	(·	* · *
	\$8.		. Yakasan	14035	14. N	1380	(-154) (. *	1	* ₄ /sF
BEACH SIZE CLASS TRANSPORT CALCULATIONS	_				31.5	Parker	Purker				
Manimura	Macconstan	Geometria Mass	STATE OF THE STATE		1.048	Potential	Pactole	Person	Potential	Perficie	<u>.</u>
Omin s	Cinna -		1861 1861 1861 1861 1861 1861 1861 1861		+	Morament		Petartici	Mass	Full	Pacticle
Size 1	See	of Oreks		year Mariantan	-		Velocity	Yelimo	QH	Valoaity	Sugarded?
in Praction	in Fraction	Size in Fraction	ı i'r ith Kacilon	ith freelies	W4	per mail width	W .	QN	M(val) "In	Wr	
(mm)	(mm)	(1000)				alpy (ma. 1874)	(-11)	4M (4274)	<u>days)</u>	(m/s)	(₩ı>U%)
0.125	0.23	0.3	1.658-04	328.502	1.18401	4.808-01	41.000	13118-01	\$26.74	0.044	Yes
0.25	0.5	0.4	3.79B-04	163.931	1.15+01	4.758-03	41.307	1.202-01	323.08 ·	0.063	Yes
0.5	1	0.7	6.56E-04	82,307	I.1E+01	1,640-03	49.460	1.178-61	315.07	0.089	No
1	1	1.4	1.3(B-0)	41.325	1.02+01	4.448-03	38.843	1.138-01	301.90	0.125	Born No
2	. 4 ()	28.4	2.606-03	20,749	37E+00	4.058-63	35,446	1.028-01	273.50	o.171 في	No.
4		5.7	5.186-03	10.418	7.7E+00	7.36E-03	29.373	\$.46B-02	228.30	0.251	No
	16	- 15 dl 4	1.03E-02	5.230	5.2E+00	2.25H-03	19.699	5.67E-02	133.1L	₩.355	Na
16	32 .	6 23 46	2.06B-02	2.676	2.12+00	8 97B-04	7.050	2 265-02	41.0[0.502	Ma
第二 「対象的は、直接され発展する場合」は、2011年にお	. 4	45	4.095-02	1319	9.0207	3.90E-05	0.341	9.#2E-04	2.65	0.709	Ne
64	126		# 15B-02	0.662	7.1E-06	3.098-09	0.000	7.79E-08	0.00		No
158	254	191	1.638-01	0.132	3.LE-09	1.138.12	9.000	3.33K-11	0.00	1.419	No
256	\$13	362	3,238-01	0.107	2.96-11	1.368-14	9.900	3.178-13	8.00	2.006	No
	×.	Acres 1					180			•	
Cleometric	Š	ann i li	13y2)	Parker		4.0					
Mean		Tributary	Perker Relative			100	100		% of Bod		
of Cenies Size in Praction	Primary		Moreonal	Potential (-				Prom		
	Impat Commented	Input (Touses/yr)			(Tennes/xx)	Deposited	Bedland	ment velocity	Paticles		
(mm)	(Tomase/yz)	(iomera)ii	((G/x)	(Tomes'yr)		(Teamer/ye)	(townsolys)	DIVI	n Motice		D50
02	20			Supported	: 29 29	•	fame to the second	_ Surpreded _	واسببط	0%	- 100 mg/s
0.4	30 4		Surperint	Justinia.			Suspended	Sugandel	وليسوسه	O% "	para seem
0.7	20		316	126	29	0	29.130	U.LUE-05	46	44	
1.4	20	.	302	120	29	ŭ"≎k,		8.5 62. 05	4%	1 ₩ 4	
2.8	25	13	276	110	36	0,	35,340	1.15 B-04 🏋	6%	14%	
5.7	15	7	226	Kar 🕶	22	· · · · · · · · · · · · · · · · · · ·	21.400	8.71E-05	4%	18%	***
11.3	· 💆	4 🔅	153	61	13	, Q ,), ev	13,440	7.79E-05	4%	2254	7 TO 1 HE S
23.6	1 1	3 🖟	61	24	्रधः 🤌		11,105	1.63E-04	- F%	50%	r Fa
451	ੋਂ, 5	3	1 (2)	5.流達安然	Park Barbara		1.015	3.53B-04	17%	48%	51.4
90.5	ÿv Mrzy ja		•	•		ੂੰ \$. `(ge	8.000	3.53E-04		F 65%	
181.0		y - 1	4 (1)	ે ્ષ છે.	D 0	1.7	9.000	3.53E-04	17%	83%	-
J62 0	e e	. I	0	_3 3√ 1	ð		1.000	3,53E-04	17%	100%	
			Total 1338		fr i	Total 13,3	N Co Und 174	Fee - 2,68-53			·
and and the second seco			1. 11.6 Sm1%	: "			71	# · · · ·			48.5
and the second of the second o											

Table 11f Reach 6 Transport Capacity Under Background Condition

		· · · · · · · · · · · · · · · · · · ·			· · · · · · · · · · · · · · · · · · ·
REACH HYDRAULIC RESULTS AND CONSTANTS			aput Particle Sime	4.4	
Channel Width - # (ra)	38	Manualog's a 0.035	Product Production	Percentage Tonner's	* ***
Sloge - \$ (m/m)	0.004	Flow (eme) 93.9	(****)	(mm)	
Wetted Perimeter - P (m)	. 39	Adr (m*2) 310	0.125	13.00% 7.61	
Cross Section Area to WS - A (m*2)	71	Flow (cine) 79.2	9.25 9.3	13,00% 7,13	
Hydraulic Radius e R (m)	L79	Percent Different 0.19	0.5	13.00% 7.11	
Depth of Scour = 1/3 R	0.60			13.00% 7.13	
Acceleration of Gravity - g (m/s 2)	9.31			16.00% 2.75	
Dennity of Water - the (kg/m ⁻¹))	£009 17.6	THEFTARY BOTT TO BEACH		10,00% 5.47	
Bed Shear Strees - Ib (Pa)	2700	Adr (m/2) 65	. <u>.</u>	4.00% 1.28	
Density of Sedimont - shot (kg/m*1) Shear Velocity (U*k)(m/s)	0.05300	Hagest Ther? Q.B. Majort (M. aby Blag - 0%)] 6 12 12 64	1.00% 1.74	
Medica Grain Siza -dSO (mm).	12	Muset (Thre'2)	. 4 in	5.00% 2.74	Table .
Percent of Bed 4 1.4 mm	1344	Budgerand 1 15	128 234	2.00% 1.09	
Percent of Bed < 2.8 max	20%	Management 12 0		2.00% 1.09	
Percent of Bed < 5.7 mm	17%		256 512	7.00% 1.09	
Percent of Bed < 11 mm	J 8%			100.00%	
	Esperior .				and the second s
PARKER EQUATION TOTAL BEDLOAD TRANSFORT				For 2 year storm	
	'r median	ina Wimedina ob medina.		Ob total	August 18 to the
(dimless)	(dimlese) (dimles		(m*1/n) (tu/n)	(Tonnet/yr)	The second second second
3.81E-02.	3.76B-02 1.544E		0.00 5.278400		
REACH SIZE CLASS TRANSPORT CALCULATIONS		A Cartin T		art.	
Mesmus 1	Maximust Come	nie - 177	Peter	Perior Purker	Bertreiter Particle
Grain	Oran Mea	ı Aylı	Polestick	Particle Potentia	Mare Full Particle
Sime The Control of t	Size of Circ	in the state of th	Movement	Velocity Volume	
in Fraction is	n Praetica Size in Fra	ction 1" ith Oscion ith Eaction -	W4 permit with	Vii Ohi	bi(vol) sile We
(mm)	(mm) (mm)		qbi (w^2/s)	(m/ht) qhi'w (m'	
0.125	0.25	3.77E-04. 154.014		9.203 3.858-0	
0.25	0.5	7.51R-04 77.129	1.18+01	1.084 1.738-0	
0.5	0.7	1.50E-03 38.826	, LOB+01 [.42B-45	8.502 5.45E-0	
	14	7.94B-03 19.494	9.12+00 1,298-03	7.766 1.948-0	
	3.8	J.93B-03 9.787	7.58+00 L#58-03	6725 104B-0	109.17 8.177 No
	5.7	1.188-02 4.914	4.9E+00 6.85E-04	4.137 2.63E-0	
16	16	2.35E-02 2.467	1.88+00 2.528-04	1.527 9.688-0	
12	132 (152) 64 (15	4.69E-02	4.42-02 6.102-06	0.037 7.34E-0	
64	128	5 A 145 A 1	3.1E-06 4.32E-10	0.000 1.66E-0	
128	236		. 1.00-09 2,408-11 2.1E-11 3.006-13	0.000 9.548-1	
256	512		2.1E-11 3.00% (5 2.0E-12 2.76B-16	0.000 1.15E-1	
1.00			S'IAB-10	0.000 (.062-)	0.00 2.006 No
Chromatero			e i da di		and the second s
Mean 35		Parker Parker			% of Bed
of Chair	Primary Tabata				Proces
Size in Frection	Input Salah Capu	Movement Movement	Ortgot Deposited	Declared mass/votos	
	Топлан/уг) (Топлан	/yr) (Ba/s) (Tuessis/yr)	(Tormes/yr) (Tormes/yr)	(Common Tr) Qi/Vi	My Particles unrelativ Approx in Motion Vi it Bed D50
0.3	79 7	Stepended Superded	36 0	Separated Superation	
0.4	20	154 109	36	36.231 4.606-0	·
0.7	29 7	147 104	P 36 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	36 23 4 23 E-0	
14	29	133	36	36.233 5.33E-0	
28	36 9	109 T 77 1/2	1 4 2 2 4 5 5 6 6 6 5 5 5 6 6 6 6 5 5 5 6 6 6 6	44.393 8.0128-0	
11.3	22 5	71	25 A A A A A A A A A A A A A A A A A A A	7.098-0	
22.6	13 (7) 3 (8) 3 (1) 11 (1) 12 (8) 3 (8) 4 (26 39	17	16.722 1.258-0	1794 1894 D50 22.1 mm
653	**************************************	1.23	0 Д	0.449 1.398-0	
90 \$	9	•	0 4	0.000 1.396-0	
IBIO	0	0	0 1	0.009 L.395-0	12% 75%
362.0	6		0	9.000 1.39B-0	No. 25 25 25 25 25 25 25 25 25 25 25 25 25
and the state of	· ·		0 1	0.006 I.39E-0	
2. 人名西西亚安 2. 19. 19. 19. 19. 19. 19. 19. 19. 19. 19		Total 642	Total 20.6	M.Cap Unit 2014 - 1-15	<u></u>
			•		D70 18.5 mm

Table 1 is: Reach 2	Toursel Com	city † facilier	Buckermand	Conditions

	- MA				a.e		
BEACH HYDRAULIC RESILTS AND CONSTANTS	5-1 Mb/	CHONOLISE CHOICE	Deptil Particle Si	SOUTH SERVICE SERVICES AND ADDRESS OF THE PARTY OF THE PA	200 X 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	٦	1.5
Channel Width • w (m)	26.5 0.00101		027 min		Toursely:	1302	- A
Slope - S (m/m) Wetted Parameter - P (m)	28.2		P.2 (mm)		()	- W.	1940
Cross Section Ares to W3. A (m'2)	47.5		4 0.125		3.00% 8.04	Sept.	100
Hydraulic Radius - R (m)	1.9	SC	9.4 0.25		3.00% R.SI	*	·
Denth of Segar • 1/3 R	0.56		0.5		100% 8.84	1. Sæde :	124 ·
Acceleration of Charity - g (m/s/2)	9.31	with the state of			3.00% 3.84	\$12.×	
Descrity of Water - sho (kg/m/3)	1000	TRIBUTANY NOUT TO RE		SANCE I WITH	6 00% 10.8E		all the same
Bed Shear Stress - tb (Pa)	16.7			Only State Company	E00% 6.00	90.9	
Density of Sediment - thos (kg/m*3)	2700	Blams Dm/2	16	(1) (1) (4) (1) (2) (3) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4	20%	33.5	
Show Velocity (U"t)(m/s)	0.05167	Mant (% abe Bleg)			90% 1.40 90% 1.44		
Median Grain Size 450 (mm)	16	Maret (T/mir/2)		1 (4) A 3 (8) (7 TO 1 TO	1 30 1500	6 (Arabat)
Percent of Bod < 1.4 mm	15%	CHEY	123			10 P 10 P	
Percent of Bod < 7.5 mm	13%		0 2 2 2 256	200033	-30009Caule	10.70	12. A.
Percent of Red 45.7 mm				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	90%	404,5	
Percont of Bed +11 mm	4%		and the same	C PASS CONTRACTOR			1 2 1 h 2 h 2 h 2 h 2 h 2 h 2 h 2 h 2 h
1. A. C.					24.	e di Libia Madeira	
PARKER EQUATION TOTAL BUILDARD TRANSPORT				For 3:	Viter (Corns		relation as
200000000000000000000000000000000000000	7 median phi median	w weden			total .		30.2
	(direden) (dimlem)	(dentes) (er				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
6.43E-02	3.76E-02 1.71049	0.38764	0.00		A 196		
44 (2.45)/42 (1.15)		TO SECOND	126		100		
REACH SEE CLASS TRANSPORT CALCULATIONS MINIMUM			424.5			ee ee	
Green	daximum Geometria Great		TANKS.		witer Parter	Potential Bericle	
Siza				Points P	efficie Polential	Moor Full	Particle
	Size of Grain I Fraction Size in Fractio	P		* ************************************	today Volume	Qhi Valenty	
(stun)	(mm) (mm)	a for the Bracker of the Br	with Wil		M CM	bi(vel) file Wy	Superful?
0.125	0.25 0.2		77	(m (m 72h) (i	alle de la constante		(We Una)
023	0.5		569 A LIBHOL		012 3.748-02	191.01 # 001C	
01	0.7	**************************************	540 [.(E40]		M26 3.658-01	10.47 TUOLS	No
VXL-12		SUBSECTION OF THE RESERVE OF THE RES	948 1.0840) 354 36 - 9.18400		3.478.42	1)45 344	360
2	2.0	1.75 p. 100 p. 1	7.4E+05		371 3 138.02	14.49 A 125	4 No
4 ~ 5 2 2 2	5.7	1 15 Sec. 45	176 4.7B+00		126 2.51E-02	68.36	No
*	16 11	SUCIO AND THE PROPERTY OF THE PARTY OF THE P	44 1.68400		350 1.61E-93	43.44 20.291	No.
16	93	1000000	79 2.4B-02		333 3.326-03	14.90 % 0.335	14 0
32	64 45		592 L.GE-06	707-11-6-17-1	030 B.07E-05	8.27 · · · · · · 0.502	No:
44	126		1.28-09		TOTAL STATE OF THE PARTY OF THE	0.00 0.709	No
178	256	4328-01	49-72-1.78-11			0.00 1.003	ge No System
236	313 361	8.588-01 Q.C	73	10 miles	Mary Company of the C	0.00 · 1.419	No No
					401E-12	0.00 1.006	No ,
Geometry:			705 March 1986				
Meun of Grain		Parker Pe				Mar Bod	
Size in Fraction	Primary Tributary	Poletice Pole		Assessment Health		Tree (
	Imput Imput	Moreuma More	1.52 300	Deposited (Se	And married	State of the state	
02	(Towner/yr)	(Sen) Com	(Turnes yr)		(N/V)	Particles whiteler	Approx
0.4	36 9 16 9	Superind June	raded to 45		onded Suspended	Stagenda Fig.	DSB
07 25 25 25	36.	95 (2)		0	071 1.038-04	3N 3N	
		**	1 C 200 C 200 C	0	6.13B-04	7N 9%	W. A. San
18 4	4		* A STATE OF THE S	F 1	571 6.ME-44	34.50 156	
5.7	28	4	**************************************	9	477 LOUR-03	8% 33%	
LU LU	in a second	1 1/3 M/C 14 N/2 DT 28 08 08 22 22 - ""	A STATE OF THE PARTY OF THE PAR	4	470 1.02E-03	31%	
27.6	0		7	4 1	344 1.48E-0)	12% × 23%	7 1 9. 0
453					234 1.482-43	12% 10%	
90.5	. 1451.		***		D00 1.482-03	1214 65%	
181 D				SOUTH AS S. T. DOSSESSES SERVICES AND TAXABLE SERVICES.	005 1.48E-03	12% 77%	
362.0	■ 1	7			006 1.49B-03	12% 18%	THE TOM
Section 2010					000 41E-03	12% T00%	
		1000(40)	197	Total LELS to Cap ?	198 498 4m=1.TE42	TO BE AND	
		A. Ore 3 A.	13 A	A Break Bloom			13.6

Table 12a. Reach 1 Transport Capacity Under Target Conditions

REACH HYDRAULIC RESILTS AND CONSTANTS			CHONORINY CHRICK		Ingrat Particle	Sint					
Channel Width • w (m)	16	in the state of the	Manning's n	. 0.066	min.		Percentage	Tonnes/yr			
Singe - 5 (m/m)	0.0101	$-\infty$. We	Flow (one)	11.5	(mm)	(mm)). ()				
Wetted Peruneter - P (m)	16.9		Adr (m/2)	76.5	0.125	0.25	13%	13.85			
Cross Section Area to W5 - A (m*2)	10.4		Flow (core)	13.2	0.25	0.5	13%	13.85	4.5		
Hydraulic Radius - R (m)	0.62		Percent Difference	-0.13	0.5	· 1	```\J3%	13.85			•
Depth of Scour = 1/3 R	0.21		T F S		1	2	13%	13.85		-	
Acceleration of Gravity - g (m/r^2)	9.81			4	2	A	10%	10.65			
Density of Water - the (kg/m*3)	1000		TRUBUÇARY DOUT	TO BRACH			16%	17.04			
Bed Sheer Stress - (b (Ps)	61.0		A4x (mi*2)	76.5		16	6%	639	!		
Denvity of Sediment - thes (kg/m^3)	2700		Bitarnel (T/ml^2)	0.9	16	32	5%	5.33	ļ		
Shear Valority (U"k)(m/s)	0.09877		Mgmt (% shy Bkg		32 .	. 64	5%	5.33	j.		
Median Grain Site -650 (mm)	dan 75		Mgrat (T/mi*2)	0.5	- 64	121	1000 TOPAL	3.13			
Percent of Bed < 1.4 mm	100 mm	ec. (2)	Background	71	120	256	2%	2.13	· ·		
Percent of Bed < 2.5 total	2555. 256		Management	36	256	\$17	¥:0.3%	2.13	- P		
Percent of Bed < 5.7 mm	14%	55					100%				
Percent of Bed < 11 mm	11%	187an	N KON						J. '		
helicular at pag = 11 mm			4.4	-similar (2)			+1				
PARKER EQUATION TOTAL BEDILOAD TRANSPORT	. 7						For 2 year electri				
(*median	(*) median	phi median	W*medies	ab prodigg	Qb total	Ob total	Ob total				
(dimless)	(dimless)	(dimbers)	(digdene)	(m*2/r)	(m^3/s)	(ha/n)	(Tourse/yr)				
	3.76E-02	1.30519	0.08029	7,25E-05	0.00	3.07E+00	2.65B+02	-			
4 91B-03		1.39317	0.00029	7.238-03	0.00		2000702				
	raigh)			14		T At	1200		•		
REACH SIZE CLASS TRANSPORT CALCULATIONS	Maximum	Geometric	1 2 m	1		Perker -	Perker	Parker	10.4.4.4		
Minimum		Mean		100	17. 19	Potential	Particle	. Polential	Potential	Particle	
Orein	Orein	of Orein	- F.			Movement	Velocity	Volume	Mary -	Tell.	Particle
Size	Size				: : : : : : : : : : : : : : : : : : :	per mil width			QH	Velocity	Suspended?
in Frection	in Fraction	Size in Fraction	i "r jih frection	ith fluction			. W	Qbl	Cpr(vot) spos		
(pun)	(mm)	(áun)		530.466	4 470.44	ebi (m*2/s)	(m/hr)	ghi*w (m^3/s)	(lqs/1)	(m/s)	(Wr > U"k7)
0.125	0.25	0.3	9.25E-05		£-1B+01	1.005-02	176.219	1.50E-01	425.56	0.844	Yes
0.23	0.5	0.4	1.548-04	266.339	1.1B+01	9.978-03	L75.002	1.57B-01	ेंं 422. 6 3	0.063	Y⇔
0.5	i tog k	0.7	3.0.0	100.721	1.1E+01	9.838-03	172.597	1.54B-01	416.81	0.089	Yes
■ 2 ()	2	1.4	1424 10.41	67.141	1.1E+01	9.57E-03	167.884	1.50E-01	S. 405.43	0.125	No
■ Control (A)	50 4	2.6	1.46E-03	33.710	1.0B+01	9.038-03	158.795	J.42E-01	343.46	0.177	No
	9	0.4 3.7	2.908-03	16.925	9.08+00	0.00E-03	141.236	1.278-01	342.53	0.251	No
8 Mg high	16	11	5.77E-03	8.498	7.18400	6.40E-03	112.270	1.00E-0}	271.13	0.355	No .
16	32	23	1.158-02	4.267	4.3R+00	3.86E-03	67,741	6.06E-02	163.39	0.502	No
32	64	45	2.29E-02	2.142	1.32+00	1.15R-03	20.096	1.80E-02	46.53	0.709	No .
64	178	91	4.56E-02	1.076	6.9E-03	6.26B-06		9.83E-05	0.27	1.003	No
128	256	181	9.09B-02	0.540	3.IE-07	4.42B-10	0.000	7.252-09	0.00	1.419	No
236	√ 512	362	1.01E-01	9.271	3.8E-10	5.23E-13	0.000	8.192-12	7.00	2.006	No
	'		in in a second of	- 4							
Geometric •											
Mean			Parker	Purkur		W	508/89		% of Bed		
of Grein	Primary	Tributary	Relative	Potential			100		Prom		
Size in Fractio≠	Ingut	_ bryat	Movement	November		Deposited	Bedicad	mese velocity	Particino	emiliji.	Approx
(PAM)	(Tonner/yr)	(Tonnes/yr)	(K#/t)	(Tonner'yz) (Tortage/yr)	(former'ys)	Ql/vi	in Motion	% in Bed	D50
0.3	0	14	Surpended	Supended		• • • • • • • • • • • • • • • • • • • •	Superded	Supposeded	Sespended	0%	
0.	. 0	14	Superior :	Surpended		0	Sagradel	Superded	Suspended	056	1
• 0.7 (1.4 A) A	Q ·	14	S. Sugarded	Superfed		3	Surpended	Baspended	Surpended	0%	- E.
14 Ng 😓	0	14	. 405	67	14	3215 0	13.845	9.41E-06	4%	4%	34 S. S.
2.8	D	<u>11</u> .	. 383 *g	< 65 m	11 – 5	, O	10.658	7.66E-06	4%	2%	
5.7 × 6 3 × 6 3	O	17	343	36	S # 17		17.040	1.37E-03	6%	14%	
H3SKI AKK	. •	6 (271	45	6		6.390	6.50E-06	3%	18%	arian si
22 6	0	5 🔍	164	27	5.0	TO CO	9.325	1.97E-06	- 7%	22%	
453 🕵 💮	•	5 🐬	40	w (o . ■ 2 ×			3,325	3.02E-05	1456	36%	7.5
90 5	0	2	\$*************************************	• •	\$		0.044	4.53E-65	21%	5794	•••
121 👁 🛴 🔩	. 0	2	•	0			9.000	4.33B-05	21%	79%	
J6Z O	0	2	0	. 0	0	3 · · · · · · · · · · · · · · · · · · ·	4.000	4.53B-05	21%	2001	
			Total 1615	•	Tipological Control	Total 6.3	4 Cm Und: 22%		_	10070	
							rich come 1134				

D39 71 pm

Table 12b, Reach 2 Transport Capacity Under Target Conditions

Charmel Width - w (m) 16 Manufarty n 0.06 min max Presentings Tennaryy	REACH HYDRAULIC REPULTS AND CONSTANTS		GEOLOGICAT CHIEF	ax.	bunt Particle	lies :	74	······································	}		
					ente.	PROCE	Promotogo	Tonger/yr			
World Principle Prop 10 13 15 15 15 15 15 15 15	Slope - 5 (m/m)	5.44	Plow (part)					-			
	Wetled Perimeter - F (m)							1.87			
Depth of News = 172 F	Cross Section Area to WS - A (m*2)							1.87			
Accordance Control C	Hydradic Radius - R (m)		Percent Differen	· 0.25		-		1.87			
Part	Depth of Scour = 1/3 R					2	L3.00%	1.07			•
Bed Since Process (PA) 1379	Acceleration of Oravity - g (m/v*2)			200		4	(0.00%	1.44	٠.		
Description Company	Density of Water - the (kg/m²3)					. 5	16.00%	2.30	3		
Part	Bed Shear Street - tb (Pe)	A 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					6.00%	0.86	والمحافظ والرازا	**	
Marches Marc	Dennity of Sedment - thou (kg/m*3)						5.00%	0.77		3 3 4 3 6	
Precision Section 1994	Sheer Velocity (U"k)(m/t)		Marris (94 ohre 2	M 118		137	3,00%	0.72	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1		
Precision Section 1994	Medies Greis Size -d50 (mm)	3	Maint (Timira)	01			2.90%	1.29	1.78	·F.%.	
Percent of the 5 2 8 am 1994 19	Percent of Bed < 1.4 mm	1.13121		IQ.				8.29	29. 3		
Parent of Bard of 11 mans	Percent of Bot < 2.5 mm	13%	The second second	200	236	512		0.29		•	
Percent field of					<u> </u>		190.00%]		
Checking Cyrindian Cyrin	Percent of Bed < 11 mm	- 3 13%			:						
Checking Communication C	1 pro- 1								-		
Second Columbia		et .		7 L	Ŋ.		For 2 year stores	· .			
STACO S.76E-92 1.50798 C.13217 7.56E-02 E.88 3.2074/00 2.26[Ed2]	(*medito									of "	
Part	(dimless)							3			
Minamum	5 148-02	3.76E-02	1,36786 0,13217	7,56E-05	0.94	3.392400	2.84E+01				
Minamum	1. On the control of	1.50		in the second			77		•		
Crain Crain Meta Glank Man Meta Glank Man Meta Crain Man Meta Crain Man Meta Crain Man Meta Crain Man Meta Man Meta Man Meta	REACH SIZE CLASS TRANSPORT CALCULATION	• " " " " " " " " " " " " " " " " " " "				100	V.,		.4.7		
Crain Size Size Size Crime Metes Size	Minimum			or officer	je sektor	Perker	Perker	Person	Peterskil	Perticia	
Size Size Size Of Cheba Vision Processor Vision Value Valu	Grein 💮 💆				7 35	Potestial	Particle				-
In Practices Same in Freedom Ch. Breedom Ch. Breed						Mercanent	Velocity				
Common C	in Fraction				. 44		. W	Obl			
0.125	(rese)					eta (he*2/s)	(MAIO)				> 13%-95
0.5 1 0.7 5.28E-96 98.874 1.18col 6.37E-63 94.876 29.816 275.37 0.095 No. 1 2 1.4 1.04E-03 49.643 1.04col 5.36E-03 94.876 29.816 20.305 0.095 No. 2 4 2.8 2.08E-96 24.825 3.08Col 5.36E-03 0.095 9.37E-03 218.48 0.123 No. 4 8 5.7 4.11E-93 2.25 3.68Col 5.36E-03 3.48E-03 23.955 6.377 No. 9 16 11 1.97E-03 6.255 6.26E-03 3.48E-03 7.28E-03 29.55 6.377 No. 16 52 25 1.67E-03 3.155 3.78E-06 3.48E-03 3.28E-03 2.48E-27 0.535 No. 16 52 25 1.67E-03 3.155 3.78E-06 1.58E-03 2.28E-03 2.	0.125				5 L.\$20+01	1338-00	67.375				
0.5 0.7 5.20E-04 98.974 1. E-01 6.57E-03 98.977 98.98.0 20.30 0.000 No. 1 2 1.1 1.048-03 69.643 1.059-01 5.90E-03 9.37E-03 228.00 0.020 No. 2 4 2.8 2.04E-03 24.925 9.800 5.5(E-03 34.936 9.37E-03 229.55 1.77 No. 4 5 5.7 6.11E-03 12.314 2.22400 4.78E-03 72.939 7.00E-03 200.10 0.231 No. 5 16 32 23 1.07E-03 3.115 3.790e 1.48E-03 32.195 5.07E-03 200.10 0.235 No. 16 32 23 1.07E-03 3.115 3.790e 1.48E-03 32.195 5.07E-03 200.10 0.235 No. 16 32 23 1.07E-03 3.115 3.790e 1.48E-03 32.195 5.07E-03 200.10 0.235 No. 16 32 23 1.07E-03 3.115 3.790e 1.48E-03 32.195 3.07E-03 200.10 0.000 No. 172 2.56 31 3.27E-03 0.300 7.875 3.3E-03 3.231 2.65E-03 3.180-07 0.000 10.03 No. 172 2.56 31 3.27E-03 0.300 7.8E-11 4.45E-14 0.000 7.17E-13 0.000 1.003 No. 172 2.56 3.52 3.63 2.27E-03 0.300 7.8E-11 4.45E-14 0.000 7.17E-13 0.00 1.003 No. 172 3.60				196.926	10+M1.1	6.2015-03	96:267				
1 2 4 2.8 2.08.6.5 24.925 9.68+0 3.48-0 3.58-0 3.58-0 2.08-0 9.778-02 200.13 No. 2 1 1 1.15-0.5 6.25 6.08+0 3.48-0 3.58-0 200.13 0.25 1.77 No. 3 1.15-0.5 1.	0.5	1 🐧			1.1 6 40L	6.17E-03					
Total Tota	1	- · ·	1.4. L.04E-03		1.06+01	1948-01	90,996				
4 3 5.7 (A)18-A2 12.314 2.28400 4.786-A2 72.335 7.608-A2 203.19 0.251 No. 3 16 11 11 1.598-A3 6.203 6.084-A3 1.692 3.155 2.984-00 1.688-A3 52.196 5.698-A2 1.622 0.355 No. 32 2 33 1.638-A2 3.155 2.984-00 1.688-A3 32.28 0.322 No. 322 No. 32	1		2.6 2.06E-03	<i>"</i> 24,925	9.65400	3.5(E-03	\$6356				
16	4		5:7 . 4.11 E-0 35	ik (2.514)	8.2E400	4.726-03					
16 32 23 1.532-02 3.155 2.98-00 1.532-02 11.61 0.302 No. 32					. 6.0B+00	3.41E-03					
128 128 91 647EAC 1.584 4.284-01 2.482-01 3.482-01 1.482-01					1.98+96	1.65R-00					
128 128	33 J. W. W. C. C.			. LS#4 s	4.75-01	24(2-04					
128 256 181 1,29E-01 0.399 1.7E-06 9.29E-12 0.000 1.68E-18 0.00 1.415 No	64			0.795	9.38-05	5.30E-08					
Consecutive	10D				1.7E-08	9.82E-12					
Comparison Primary Tributary Relative Potantial Primary Relative Primary Relative Primary Relative Primary Relative	256	512	367 2.57E-01	0.200	7.88-11	4.45 E- 14	0.000				
Control Primary Tributary Ashirine Potential Deposited Berline Size in Frechots Inject Inje	24878,1978				•		127			4.500	No
More Company Primary Tributary Registration Registrati				Maria.		ang paramagan	- 10 No.	and the second			
Common C					W.	of the second	7000		Staf Bad		
Company Comp					.연 항상:	•		8			•
Company Comp						Deposited	Bufford	man/valuable		-	
0.2 16 2 2002 16 8 2002					(Towner/ye)	(Treased'ye)	(Niconalistan)				
0.7 1 200 2 15 0 15.727 1.00240 3mpout 190 1.1 1.4 231				إفارسونية الأراب	2 10	N	William Control of the Control of th				224
0.7 1.4 1.5 2.8 2.8 2.8 2.8 2.8 2.8 2.8 2.8 2.8 2.8				Barrendel	. IF	1 8 B. S. S.		at producting			9.ĝ i.
2			All the second s	•	1	0.2		I million			
17 1805 48 19 1846 1648-65 64 1394 1394 1395 148 1395 148 1395 148 1395 148 1395 148 1395 149 1395 149 1395 149 1395 149 1395 149 1395 149 1395 149 1395 149 1395 149 1395 149 1495			70. 1 . 20. A. F. T. W.	61	16	• ***					
11.3 1.45 1.5 7 0 18.584 1.585.03 79. 2894 22.6 22.6 2.7 1.585.03				57	. 12						
22.5 2.7 27 27 27 0 6.005 2.745-85 606 3096 3096 3096 3096 3096 3096 3096		13%	- C 2 (200)	44	19	9			40		
23.5 45.5 90.5 10. 2 2 4 7.685-45 18% (774. 52. 50. 50. 50. 50. 50. 50. 50. 50. 50. 50		■ Says:		. u	7	0.88					
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101.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		- 329		(C) - 💢 🖫 🗱		4.50				- XX	S 250
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Total (2012	C-0.771 8 - 7	D	0	<u>~</u>	0		10 mg 10 mg 20 mg 20 mg 10 mg				ASS ST
	and the state of t		Total (202		F 1 1	Tetal 4.5			144		ar e
- 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		4.4	***							(Target	
							Let.				16 S

Table 12c Reach 3 Transport Capacity Under Target Conditions

PEACH HYDRAULIC RESULTS AND CONSTANTS.		CONSTRUCTOR STATE		TOWN	A. c
Channel Width - w (m)	22 23	Manabajo a	Lagray Purticle Class	Contract of the Residence	
Slope - \$ (m/m)	0.00874	Plote (mar) . 3 10.5		Presundings Televisiye	A 1977
Wetled Parameter - P (m)	22.4	Adr (mr2) 170 k	(mar) (mar)	. (****)	
Cross Section Ares to W3 - A (per2)	19.6	Plow (case)	0.125 7 0.15	13.00% 10.17	
Hydraulic Radins - I. (m)	(,) () () () () () () () () ()	3.5	0.25	- 13 00% 16.27	
Depth of Senur = 1/1 R	0.79		45	13.00% 10.27	
Acceleration of Grevity - g (m/e*2)	9.81	and the second		13.00% 10.27	(SI 2 ^{mm} 1√27) 1√38 (a.e.)
Density of Water - rico (kg/m/3)	JOOD	30000 3000 2000 2000 3000	366	10,00% 7.00	
Hed Shear Stress - th (Pa)	75.0	TRISUTARY BOARS TO REACH		3 1-2 1000000 2000000 2000000000000000000	
Density of Sediment - rings (kg/m/3)	2700	Adr (mir2)			
Shear Velocity (U*k)(m/s)		Bland Tow?	2 16 12		
Mediau Grein Stre-d50 (mm)		Mart (the line Blag Thingson)			194 5. W.
Percent of Bed < 1.4 mag	Alice Salara 🗪	Maria (Traits) - 1 as ha	e u	100% 391	
	444	Buckground		2,0004 1.51	
Percent of Bed < 2.8 mm	14%	Management		7.90%	
Percent of Bed < \$.7 mm	KO (1996) - 1496 - 1496 - 1496	100 mg	256 512	3,00% 1.58	
Percent of Bed < 11 mm	17%	ATT W		100.00%	İ
anger and the second of the se					-
PARKER EQUATION TOTAL BIOTION TRANSPORT			- 1 1.6×1. 10 50€ €	.	
("тофел	("Y modian " whi medical"	W'media. • eb audia		For 2 year clores	
(dimber).	(dinter) (distinu)		Ob total Of load	Citatal	
5 01 E-02	3.76E-02 1.33202	U17 (2-117	Ortivo Aurio	CCennety()	
		0 10020 1,345-9	STATE OF THE PARTY	4318×9;	To the second second
REACH SIZE CLASS TRANSPORT CALCULATIONS	Andrew with the control of the cont	WALL A			
Minimum	Maximum Clanmatics		3 A. Nico		
Orași,		LACTE C		Pater Dute	
Sine	37 () d		· Property		Polantial Particle
in Fraction		W		Patricia Potential	Man Full Particle
(men)		1" ith fraction ith fraction	WY personal	Velenity Velenia	CM Velocity Surpended?
	(mis) (ma)		e (a 14)	The second of th	MCro0n4
021	0.25 0.2	7.688-03 651 962	, [.18+0]	(m/h) phi/m (m/h)	Dato (M/s (M/s VHz)
0.5	Q.S	1.53B-04 127.339	1.18101 (168.02	147,369 3,018-0)	The state of the s
	7 2866 8 TO WAR TO CHROSE	3.058.04 764.342		160 417 2908 01	Park and the Committee of the Committee
2 ****	14	6.07E-04 \$2.518	5. 15.75 (Page 1997)	166.333 Zejildi	THE PARTY NAMED IN COLUMN TWO
	2.8	1.218-03 41,433	70.700000000000000000000000000000000000	167,029 2,898-01	The same of the sa
		2.41E-03 * 20.002	A TOWNS THE PARTY OF THE PARTY	135,641 2.16B-01	744 AA 8828
72 - 1 - 4 - 4 - 4 - 4 - 4 - 4 - 4 - 4 - 4	\$5 \\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	4.80E-03 19.444	ANNUAL PROPERTY AND AND ANNUAL PROPERTY AND ANNUAL PROPERTY AND ANNUAL PROPERTY AND AND ANNUAL PROPERTY AND ANNUAL PROPERTY AND ANNUAL PROPERTY AND AND ANNUAL PROPERTY AND ANNUAL PROPERTY AND ANNUAL PROPERTY AND AND ANNUAL PROPERTY AND ANNUAL PROPERTY AND ANNUAL PROPERTY AND AND ANNUAL PROPERTY AND AND AND AND AND AND AND AND AND AND	142,071 2.JZE-01	Ann at the same
16 · 10 · 10 · 10 · 10 · 10 · 10 · 10 ·	32 23	9.53E-05 3.244	7.78+00 9.548-03	117.787 2.098-01	Add OR
32	64 (100) 45	1.908-02 2.613	5.28+00 6.41E-69	79,003 1.406-01	100
64	125	3.798-02 1322	. 1 (B+0) 2.50E-01	31.613 3,613-02	The state of the s
126	256 IRI		9.28-02 1.148-04	1.495 2.49E-03	151.45 0.709 No
256	512 362		7.432-06 9,108-09	#.900 (.99E-97	6.73 1.865 No
	No.	1.306-0) 9.333	3.18-09 3.838-12	0.000 \$ 422-11	0.00 1.419 No
Grometrie	All the second s		2 10 10 10 10 10 10 10 10 10 10 10 10 10	**************************************	0.00 2.006 No
Monn			See 1	The state of the s	
of Crain 😕 📆 📆	Primary Tribulary	Perker Perker			
Size in Practices	Input Input	Rabibra Potential			Not Bed
(mm)	(Tonnes/yg) (Tonnes/yg)	Morement Morenage	Codesit Deposited	Defined	A Property of the Control of the Con
0.1 0.4 0.7	LE JO	(Kett) (Tourselys)	(Temperatur) (Temperatur)		Particles Countletive Appear
0.4	. 16 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	Designation Surprised	THE CONTRACTOR OF THE PARTY OF	Comment (SA)	In Motion . No Bed Die
07		Surpended Surpended	. M		
F de company (F de Carlos)		Serpended Imperded	26	Designated Supported	Ampunded 91
18	17	780 149	26	Parpended .	Despended 966
17 · 27 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	. 16	746 142	29	31.00 1.61E-01	146
11.3		601 130		14.007 1.47E-01	316
224	5	564 jas	37	31.979 2.57E-03	· m
45.3		379 72	E. II % ♥ ` 9%#\ ♥ 9%#`	1.152.01	《多··三三》,《金·金··································
90 5		15] 29	, , , , , , , , , , , , , , , , , , ,	3.84E-03	너는 글로움이 어느까지 불통管導다면 가면 맛이 되고 어떻게 되다.
IS1.0	0	7	- Tarana (1990)	6.486 2.328-43	the second of th
162.0	2	0 0	₽	1.394 1.548-04	
The second secon	. 0 2	- 1931 Br		9.500 I.OHB-64	₹ 20% S0%
	-	Total 3308	<u> 1</u>	8,000 1,04E-04	25% 75%
		white	Te62 3.45	Si Cap Diede 1756 Ben - C. 20-64	25% 100%·

Table 124: Reach 4 Transport Casseity Under Turnet Condition

EXACK STORAGUE RESILETS AND CONSTANTS				GEOMETRY CHICK		Innut Particle S				1		
Channel Width - w (m)		.3		Managaria a	0.035	Inflat Latera 2				ì		
		01612		Flow (care)			inesi forma	Percentage	Toener'y:	Į.		
Steps - S (m/m)		213.			47.9	(mm)	(were)	(*****)		[
Wetted Perimeter - P (to)				Ade (m²2)	192	0.125	0.25	13.00%	4.06			
Cross Section Arms to WS - A (m*2)		19.1		Flow (tone)	42.9	0.25	0,5	13.00%	4.06	l .		
Hydraniic Radina - R (m)		0.57	•	Percent Differenc	0.12	0.5	1 .	13.00%	4:06	{		-
Dupth of Score = 1/3 R		6.19				1	2	13.00%	4.06			
Acceleration of County - g (m/s'2)	•	9.81	•			2.	•	19:00%	3.12			
Density of Welet - the (kg/m^3)		1000		THEOTAXY NOUT		4		14.00%	4.99	Ì		
Bei Zieur Strees - th (Pa)		91.0		Adr (ml/2)	11		16	6.00%	1.87	I		
Density of Sediment - thes (kg/m^3)		1700		Blagrad T/mi*1	L.9	16	32	5.00%	1.56	ł		
Shear Velouity (U"k)(m/e)	0	12069	. ત	Myself (Webv Blog		32	14	5.00%	1.56			
Medies Orem Step-dS0 (mm)		113		Mark (The 2)	0.9	64	128	2.00%	0.62	t		
Percent of Bell 4 1.4 mm		5%		Background	ZI	120	256	2.00%	0.62	1		
Percent of Bed 42.0 mm		2%		Matugement	10	256	213	2,00%	0.62			
Percent of Bed < 5.7 mm		E4%						100.00%		J		
Percent of Bed 5 11 mm		19%										
PARKER BORATEON TOTAL BENLOAD TRANSPOR				, .			4	E-8	_			
PARKER ECROTES TOTAL REPLAND TRAVELOR	i ⁿ t melion		phi medies	W*mindies	ob sendian	The base of	All and	For 3 year steen				
	(dimbes)		(alimites)	(Aimless)			Qb setal	Ch total				
(dimless)			1:29054	0.07072	(147/1)	(#"36)	(in/s)	(Tonner'ye)	-		* *	
4 \$5E-02	3.763-02		1:35636	0.07072	1.168-01	9.00	1.48+01	8.97E+82				_
REACTI SEES CLASS TRANSPORT CALCULATIONS	· 4"		3.0	i gant as			1 20	• * *				
Minimum	Maximum		Garmstric				Puber	Pador	Pedrae	Potential	Particle	
Omia	Grain		Moss				Polanikal	Pacticle	Potential	Edna)	74	
. Sizza	Man		of Grain					Valority	Volume			Periodo
in Phaetion	in Practice.		Size in Fraction.	Abrilla Brantion	ghi ith fraction	W4	Morning	Y W		QM.		Segranded?
	(Mary) an Litheracur		(100) (100)	ACT THE MEMBER	(M. mecacu	₩-1			QLi.	(4/mi)*A		
(ma)	025		93	6.148405	790,103	1.12+01	1.542-02	(m/m) 343/745	h was b			(We > UN(Y)
0.125	0.5		. R.4	6.14E-05 1.22E-04					6.86E-01	1636.06	8,044	Yes
0.25	U.)		8.7		396.690	t.t 2 +01	1,30%,37	344,141	6.038-01	1628,47	0.053	Ye
0.5	•			2,442-04	199,[75	[.[2+0]	1.013.42	340,943	3,988-01	1613.43	0.009	Yw
1	2		1.6	4.95B-04	F60.003	1.18+01	1.782-62	334.703	5.87E-01	1593.01	0.125	No.
2	4	•	2.5	9.668-04	50.210	1.08+01	1.712-02	322.500	5.65B-01	1525.07	0.177	No
4			3.7	L.92B-03	25.320	9.68+00	1.59B-02	299.229	3.24E-0)	1415.95	0.351	No
	16		14	3.838-03	12,637	2.3B+00	1.365-02	256.780	4.50E-01	1215.00	0.355	No
16 32	17	_	23	7:608-03	6.333	698+00	9.303.43	136,249	3.26E-01	\$81.33	0,507	Ne
	. 64		45	1.578-02	3.191	2.92*10	4,0305-03	90,309	1.59E-01	430.18	8.709	Na
<u>st</u> ,	120 256		91	3.032-02	1.442	4.58-01	7.343-04	13.033	2.438-02	65.54	1.083	No
[28			181	6.032-03	0.804	I.[11-0 4	1.798-07	0.003	5.525-06	0.02	1,419	No
254	31Ž		162	1,202-01	0.404	1,96-08	3.21E-11	0.000	1.06E-69	0.00	2.006	Ne
Grounstric												
Mone				Parler	Perfore			71°		% of Bed		
of Chruin	Primary		Tributary	Zelnikou.	Potential			**	-	. From		
Size in Fraction	laped		Expet	Morecul	Movement	Defaul	Deposited	Belland	muse velocit		westeriv	Аруких
(mm)	(Товнов/уг)		(Tormen'yr)	(CaA)	(Toursey))		(Tominion/11)	(12000000/21)	0)//4	In Motion		D50
0.2	26		į.	Samuel .	3	30	0	Superited	Superiod		046	
0.4	26		i	Sectional	Despisated at		Ď	المأسونية	Superior	Perpende	0%	
0.7	26			Supended	Jupouled.		Ó	Supported	Jurumled		0%	
1.4	26			1504	100	30	ò	30,039	1.02E-05	5%	5%	•
2.8	20		j	1526	-199	23	ŏ	23.107	S.(BE-06	4%	9%	
5.7	32		Š	1416	138	37	b	34.971	1.418-05	7%	16%	
(1.3	12		ž	1215	153	14	ŏ	13.064	6.16E-06	3%	19%	
22.6	10		2	181	111	. 12	ă	11.354	7.065-06	3%	22%	
45.3	6		•	43D	34		ă.	7,986	1.00B-05	3%	27%	
90.5	ì		i	. 65		2	. 0	1,906	1.572-05	276 8%		117
INIO	ė		;	0	ō			0,002		33% 570	34%	133
362 0	8,		- 1	ŏ	0	-	:		6.21E-05		67%	
207 6	•				. •	•	7-11-2	0,000	6.11B-05	33%	100%	
1 to 1 to 1 to 1 to 1 to 1 to 1 to 1 to			•	Total 7118			Total 1.2	About of this base	Bay = 138-04	•		
												D59 1)1 ==

Table 12s: Reach 5 Transport Capacity Under Target Condition

Change Width - 24 (m)	25		Maraingh a	0.035		MEX	Percentage	Топпен'ут			
Slope - 3 (m/m)	0.00309		Flow (case)	38.8	(ma)	(rind)	(mm)		Ι.		
Wetled Perimeter - P (m)	26.1		A& (m*2)	245	0.125	0.25	13,00%	14.03		•	
Cross Section Area to WS - A (m^2)	32.2		Flow (com)	58.6	0.25	0.7	13.00%	14.03	ŀ		
Hydraulic Radius - R (m)	1.23		Percent Difference	0.60	0.5	ī	13,00%	14.03	1		-
Death of Score = 1/3 R	0.41				ï	ž	13.00%	14.03	t		
Acceleration of Gravity - g (m/V'2)	9.82		C. 12.55	.]	, , , , , , , , , , , , , , , , , , ,	- 7	10.00%	10.60			
Descrite of Water - the (ke/m*3)	1000		THERTARY MEUT	TO BEEN !	1	7	16,00%	17.27			
Bed Sheat Street - th (Pa)	37.4		Adt (m25)	33		16	6.00%	6.45	1	•	
Dennity of Sediment - they (kg/m*3)	2700		Blumd Yant'2	13	16	32	5,00%	3.40			
Shour Velocity (U*2)(m/s)	0.07735		Managers and Blue		32	ä	3.00%	5.40			
Median Grain She 450 (mm)	40		Manak (17mil*2)	9.7	- 54	128	2.00%	2.16	ļ		
Percent of Bell of L. Comp	9%			69	128	236	2.00%				
Percent of Bod 4 2.1 mm	11%		Beckground	39	256	330 311	2.00%	2.16 2.16	1		
Percent of Beil < 5.7 mm	20%		Managamunt	37 J	230	311	100.03%	4.10	ł		
Percent of Bed < 11 mm	24%			, 1			LOUIDAN		,		
A referrit of Date of 14 miles	4170					. 9					·
PARKER HOUATION TOTAL REDLOAD TRANS	e/a-r						For 2 year storm				
l'median	t'r median	والمراجع المالو	W*median	d medica	CHARLES.	Qb (wind	Qt take				
(distres)	(dinders)				Qb total						
5.61E-02		(diralese)	(dimbins)	(m*2/i)	(4/36)	(Tar/s)	(Tourseyr)				
3'476'-65	3.7 6E-02	1.49849	0.39333	1.28E-04	6.00	E72B+00	7.53B+02				
BEACH BIZE CLASS TRANSPORT CALCULATIO		-	. 25%			1					
Ministers	Maximum	· ·			· .	Parket	Parker				
Circle		Geografia						Parket	Potential		No. area.
Sign	Green	Mean	•	## A C		Potential	Perficie	Palential.	Minor	741	Particle
	Sine	of Gitale		p id		Maranant	Vehelly	Volume	Chi	Velocity	. Harpendadt.
in Fraction	in Propins	Size in Practices	I'v lik Britting	ith Greine	#4	bat may sappy	M		Pilot), V		
(mm)	(me)	(min)				44 (m224)	(m/hr)	N°w(m/3/)		(1004)	(We > U*k/)
0,125	0.25	0.2	1.73E-04	326.536	1,15+01	CHOE OL		1.118-41	326.74	+014	Yes
0.35	0,3	0.4	3.44B-04	163.973	1,1 E+0 1	4.758-03	41,367	1.20B-01,		0.063	Ties
0.5	1	0.7	6.848-04	22.32E	1.1B+01	4.645-03	40.641	1.178-01	30530	0.009	No
· <u>*</u>	2	:: [,€ `	1.3612-03	41.336	1.02+01	L4/#-03	38.843	1.122-01	301.91	0.125	No
·	4	2.8	2.718-03	20.754	9.3E+00	4.0518-03	35,448	1.022-01	275.52	0.177	No
<u>•</u>		5.7	3.41B-03	10.429	7.72.00	7.305-63	29.376	8.46E-02	228.32	0.751	No
	re.	. .	J.00E-02	5.232	5.35+00	2.258-03	(9,70)	5.67E-02	133.14	0.335	No
36	32	20	2.14B-67	2.637	1.(2400	0.97E-04	7.854	2.24E-02	61.04	0.502	No
32	64,	49	4.375-62	1.319	9.02-02	3.91E-03	0.342	9.85E-04	2.66	0.709	No
🚅 🔭	128	91	8.51 8-02	0.663	7,25-06	3,102-09	0.000	7.822-04	9,00	1.003	H-
128	256	191	1.69E-01	0.332	3.1E-09	1.33B-12	0,000	3.34E-11	0.00	1.419	No
236	512	362	3.38E-01	0.167	2,98-11	J.26E-14	0.000	3.18E-13	0,00	2.006	No
Cemtelic										-	
Menn of Chain	E		Parker	Perker		***	> -		% of Bod		•
	Irinary	Tributary	Rubliro	Potential			그 소개도		Peter		-
Sing in Practices	Input	bepat	Movement	Movement	Codpins.	Deposited	Bedard	mun/volcest			Approx
(m#)	(Tenues/yr)	((comes/s)	(4)	(Comments)	(Toundalyz)	(Tonues ye)	(lonned)	O/VI		% in Bed	D#0
0.5	30	14	اخلينتونية	Superided	44		Superior			0%	
0.4	30	14	Proposited	Surpended	44		Superdel	Surpession		8%	
0.7	30	. 14	316	178	44		44.073	1.24B-D4	4%	456	•
14	30	14	302	170	44	D	44,973	1.308-04	4%	9%	
28	20	u .	278	155	34	0	33.902	1.09E-04	4%	12%	
5.7	37	17	22#	129	54	0	\$4.244	2.113-04	7%	20%	
, Ha	14	6	153	86	20 `	0 /	20.341	1.188-04	4%	24%	
27.6	12	. 5	51	34	17	•	16:951	2.468-04	8%	32%	
45.3	1 · .	5	Ý	1	1	12	1.496	4.99E-04	17%	49%	48
90.5	2	2	` ò	Þ	•	4	0.000	4.99B-04	17%	66%	-
191.0	0	2	0	0	•	2	0.000	4.99E-04	17%	23%	
362.0	0	2	. 0	. 0	•	2	0.000	4.99B-04	17%	100%	
	•	_	Total 1332	•		Tetal 20,3	% Cup Used: 23%				

Table 12f: Reach 6 Transport Capacity Under Target Condition

REACH STYPHAULIC RESULTS AND CONSTANTS

Charmel Width - w (m)	34		Mussing's a	0.035		inex.	Percentage	Tenner'y:			
Slope - S (m/m)	0.001		Flow (come)	93.9	()	(max)	(Atta)				
Wetted Perimeter - P (re)	34		A4 (m/2)	310	0.125	0.25	13.00%	8.92			
Cross Section Area to WS - A (m*2)	71		Piow (case)	79.2	0.25	0.3	13.00%	8.92	1	:	
Hydensko Radiur - R (m)	1.79		Perpent Difference	0,19	0.5	ï	E3.00%	832			
Depth of Server = 1/3 R	- 0.60	•			ĩ	2	13,80%	8.51			•
Acceleration of Gravity - g (m/e*2)	9.81			1	•	•	10,00%	6.86	ł		
Density of Water - riso (kg/m^3)	1000		TREBUTARY BAPOT T	m s Tarae	- 1	ì	16.00%	10.98			
Bed Show Street & (Pu)	17.6		Adr (mirro)	6		16	6.00%	4.12			
Density of Sediment - ther (kg/m^3)	2700		Brawl June,	0.8	16	32	3,00%	7.42 3.43	Į.		
Sheer Velocity (CPTS(n/s)	0.05300		Manie (Namby Dies		10 32	54 54	5.00%		·-	- '	·
	17		Magnet (7/m/*2)	7.2	54 64	122	2,00%	3.4)	1.		
Median Grafe Sine -(S8 (mm)								137	: /		
Percent of Bid 4 1.4 mm	. (3%		Beckground	55	129	256	2.00%	1.37		•	
Percent of Bed < 2.0 mm	19%		Managhtsent	14	256	512	2.00%	1.37			
Percent of Bed < 5.7 mm		•					100,00%)		
Percent of Bed < 11 mm	41%						+ 5	2			
	•										
PARKER EQUATION TOTAL MEDICAD TRAN					<u> </u>		For 2 year storm	٠.			
l ^e medina	1°s median	بمنتعد ياد	Windson.	ob motion	Q5 total	Op gray	Qb total				
(diplex)	(Kimless)	(بساسته)	(distint)	(m*2%)	(m/3/4)	0***	(Continu/yr)				
6.198-02	3.74B-02	1.64667	0.50134	7,008-03	0.00	7,20E+00	6.2784-02	•			
			•		1 - 6						
LEACH SIZE CLASS TRANSPORT CALCULAT	TC200 A					* **					
Ministra	Maximum	Gerteetdo			14 11	Policie	Parger	Perker	Potential	Particle	
Cirvin	Quin	Marie,	1			Potingial.	Parliche	Policial	Minn		Particle
Size	Size	of Grain		æ		ايرفيسونونا	Valority	Volume	OM	Velocity	Sugarded?
in Practice:	in Procision	Size in Fraction	("y ith faction	Ma Buildian	wi	per well width	VI	CM	Marin .	W.	
(map)	(mm)	(mm)			A. Z.	mi (m*2/s)	(m/hr)	Marin Marin		(min)	(W+ > U*kr)
0.125	0.23	0.2	4.02E-64	134.075	1.1 2 00	1,519-01	7.200	5.858-62	134.00	0,844	Yes
0.25	0.5	0.4	8.00E-84	77.359	1.1E+0L	1.469-05	8.945	5,728-41	13139	0.863	No.
0.3		0.7	1.59E-03	38.841	1.06+01	1.428-63	8.542	3.438-42	147.97	0.889	No
1	4	1.0	3.1738-03	19.50l	9.2E+00	1.298-0)	7.744	4.948-82	133.41	0.123	No
2	4	2.2	6.32E-03	9.791	7.56+00	1.052-03	6353	4.04B-02	109.14	8.177	No
	ì	5.7	1.268-02	4.916	4.9E+00	6.16E-04	4.138	2.638-92	71.08	0.251	Ho .
.	16	11	2.51E-02-	2.460	1.E+00	2.53E-04	4.138 1.524	9.69E-63			Ho Ho
16	32	23	3.00%-02	1.239	4.4B-02	6.13E-04	0.037	2.35E-04	26.17 0.64	8.355 0.502	No.
32 ·		45	9.95B-02	8.622	1.18-06	4.34E-10	0.000				• •
		92						1.67B-08	9.00	0.709	Νo
64	128		1.9000-01	4713	1.00-09	2.49E-13	0.000	9.57E-12	0.00	1.003	No
. 128	256	[8]	1.95¥-01	0.157	2.2E-11	3.00E-13	0.000	1.65B-23	0.00	1.419	No
256	512	362	7.868-01	0.079	2.06-12	2.76E-16	8F 040	1.06E-14	0.00	2.006	No
Geometric				-							
Menn			Parker	Parker					% of Bed		
of Onia	Primary	Tributary	Roletivo	Potential	4.5		. 1		Trom		
Size in Praction	berei	Irget	Morningal	Movement	Cutyet	Deposited	Belleni	mus/vibrit	Particles		Approx
(mrt)	(Tennen/yr)	(Tensority)	(Ke/k)	(Tomer're)	(Former'm)	(Tomeways)	(Continue)(rg)	OW/	in Motion	N in Bed	1350
0.2	44"	9	Suspended.	Superded	55		Sugmaded	Surproduct	Burnende	0%	
0.4	44	9	154	k51	33	0	52.997	6.73B-04	416	4%	
9.7	44	9	247	L#4	53	•	12.997	7.076-04	4%	9%	
1.4	44	9	233	130	53	ō	57,997	7.798-04	596	13%	•
2.8	34	7	109	107	4	ě	40,767	7.328-04	5%	18%	
5.7	54	Ú	71	69	65	ě	65.227	1.905-03	1194	29%	
ห็ว	20	ĩ	26	25	24	š	24,460	1.83B-03	11%	41%	20
22.6	17	ì	ï	ī	7	20	0.620	1.52E-03	1276	52%	
45 3	í	ź	i		å	3	0.000	1.92E-03	12%	54%	
90.5	1	;		ŏ	9	1	0.000	1.928-03	12%		
	:	:	•		-					76%	
[8] 0		:	0	0	•	1	0.000	1.928-03	12%	88%	
362 0	•	ı	. 0	. •	0		0.000	1.925-03	. 12%	100%	
			Total 642			Total 28.8	16 Cap Deck 2016	Fee - J.62-02			
	•										D50 17 🚃

Table 12g: Reach 7 Transport Capacity Under Theyel Conditions

										•	
REACH INTERACTOR MEDICATE AND CONSTANTS			CHONEST CHICK		Input Particle Si	·····	1,000				
Chausel Width - & (to)	26.5		Managing a	0.027	min.	HWAT.	Percentage	Townshirt			
Slope - \$ (m/m)	9.00101		Flow (case)	79.2	(()	(man)	(min)				
Wetted Perimeter - P (m)	28.2		Adr (m/2)	341	0.123	6.25	13.80%	13.12	1	.=	
Cross Section Arts to WS - A (m*2)	47.5		Flow (one)	89:4	625	رون .	£3:00%	13:12			
Hydrogia Radius - R.(m)	1.68						13,30%	13.12			
		•	Percent (Afficence	-0.12	0.3	1			. .		
Depth of Scour = 1/3 R	0.36			•	1	2	13.00%	13.12			
Acceleration of Chirity - g (m/s*2)	9.BL				3	4	10.00%	10.00	l		
Density of Water - sho (kg/m^)	1900		TRIBUTARY RPUT		4		16,00%	18.15			
Red Sheet Street - th (Ps)	16.7		Adr (mirg)	31		16	6.00%	6.05			
Density of Sedimint - shor (kg/m^3)	2708		Blumat Timb's	97.李厚。) 16 <u></u>	32	3.00%	5.00			
Merce Valuably (LP)()(m/s)	0.05167	5.5	Migrat (% aby Blue	42%	39	1	3,00%	9.05	Ì		
Medies Grain Size -ISA (mm)	15	,	Manut CE/mir 2)	:::1s4	84	128	2.00%	2.02	1		
Parengi of Bod < 1.4 mm	16%	vo.	Duckground	#	128	255	2,00%	2.02			
Percent of Bed 43.8 mm	21%		Munegoment	33	256	512	2,00%	2.02	ĺ		
Percent of Bed < 5.7 mm	33%			-	1		100,00%		1		
Percent of Bod < 11 mm	466						144331		,		
I at company at the second sec	. ****						-				
PARKER EQUATION TOTAL SEPLOAD TRANSPO				**						-	
		NO all marks	The contract	4 1	.3, 1	AND MICHIGAN	For 2 year flores	•			
t*medien	t's median	مستفريس اداج	W. Station	d) majim		Qu total	De total				
(disalain)	(timbre)	(distant)	(distant)	(10/9240)	(=734)	(turi)	(Constaller)				
6.902-02	3.76B-03	1.43553	0.77367	1.00E-04	0,00	7.1405+00	6.188+42				
		.,				**4.4	. 77				
REACH SIZE CLASS TRANSFORT CALCULATIONS			4 (44.5)				*	•			
Minimution.	Massingum	Geografija	•			Puller	Puder	Politic	Potential	Particle	
Circle	Coming Company	Mess		-		Political	Participa	Political	Marie	Pd.	Perticie
Sime	Sire	of Grein		200	. A.	New York	Valentir	Valen	OM	Volumby	Separated?
in Fraction	in Praction	Size in Practice	t'r ift faciles	ith Section	: **** ***	per will width		Chi	H(=0/1	W.	
(im)	(Franci)	(matt)	• (15k-4		384 s.c.	et (arth		Market Mark			(We>Dist
0.723	0.23	0.3	4.718-04	146,829	[.1840]	1,4114-03	2.032	1.74E-02	161-61	0.044	Y
0.25		0.4				1.318-43	8.526	1,658-01	72.50	0.043	
0.75. Q.1	0,5		9,378-04	73.420	1.1 8101		239		93.63	0.000	.¥ø∴,
- 	1	~0.3	L87E-03	34.963	1.08+01	1318-03		3,475-02			No
4	2	1.4	3.77B-03	18.559	9.15+00).1 8% -03	7.577	3.13E-03	\$4.49	0.425	No
2	. (* **	2.0	7.41B-03	9.316	7.4 8:+10	9.56E-04	6.127	2.558 02	62.37	0.177	Ne
and the control of the state of the control of the state of the control of the state of the control of the state of the control of the state of the control of the state of the control of the state of the control of the state of the control of the state of the control of the state of the control of the state of the control of the contr		5.7	1.485-02	4.672	4.7 <u>R+6</u> 0	6.0715-04	3.891	1.613-02	0.0	0.251	No
1	16	1)	1.94E-02	2.349	1.687490	2.前8-04	1.337	5.5 7R-0 3	14.92	4.355	No
16	32	29	1.818-02	1.179	2.48-02	3.002.06	0.020	# LIE-05	0.22	0.502	Жp
32	64	45	1.17550)	0.592	1.66-06	2.11E-10	2,000	5.39B-09	0.00	0.709	No
61	126	<i>₩</i> 91	2.37B-01	0.797	1.25-05	1.332-13	A .000	4.07B-12	0.00	1.003	No
128	256	ier	4.6TE-01	9.149	1.78-11	2.928-15	0.000	3.89E-14 ·	0.04	1.419	No
256	512	362	9.21E-01	0.075	t.BB-12	2.278-16	0.000	6.01B-13	6.00	2.006	No
											*
Geometric				•		**			1		
Moun			Parker	Parker				-	% of Bed		
of Cruin	Primary	Tidutary	Relative	Potential		55*	14.5		Treat		
3.00°	Instat			Moviment		Departed	Belleuf			wantedly	
10 17 Williams 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		Trapet	Maranagi.								
	(Tonses/yr)	(Топина/уг)	(Fat)	(Tempera):		(Tunning)	(mare)n)	O/VI	la Mollos		D50
3000 - 10 - 10 May 10 - 10 - 10 - 10 - 10 - 10 - 10 - 10	53	13	Bayer Sed	Superiord		.		Suspended	وليبوينك	994	
0.4	\$3	13	***	159	. .	•	56 î î î	8.53 2-04	5%	3%	
y and a second of	53 ·	13	M	(4)	. 66	•	66 1 16	9.002-04	3%	10%	
1.4	53	13	84	129	66	D	66,116	9.978-04	696	16%	
2.0	41	10	a	105	51	0	50.850	9.488-04	5%	21%	
5.7	65	16	43	67	67	15	66.537	1.958-03	11%	33%	
11.3	24	5	15	23	23	3	22.854	1.95(5-03	11%	44%	12
22.6	î	š	à	6	6		0.336	1.956-03	11%	33%	
45 3	:	. 5	6 € .		ě,	2 ×	9,550 9,500	1.938-03	11%		
90.5	i	. 3	W.	-		7	3.55.00	1.952-03		66%	
	-	-		0	0	2	0.000		11%	78%	
181.0	0	2		0	ő.		0.000	1.952-01	11%	29%	
362.0	•	2		. •	Đ	3	0.000	L.95 B -03	. 11%	100%	
			Total 404	-	•	Total 38.9	14 Cm Und: 37%	8m - L75-42			

Appendix C: Response to Public Comments Received on the

Draft Middle Fork Payette River Sub-basin Assessment and TMDL

The Draft Middle Fork Payette Sub-basin Assessment and TMDL (Draft TMDL) was made available for a 45 day public comment period which extended from September 30, 1998 through November 18, 1998. Copies of the Draft TMDL were presented to the South West Basin Advisory Group and cooperating agencies and stakeholders at their October 1st, 1998 meeting. Notices containing a draft document description, locations of available copies, directions for written comment submittal, IDEQ agency contacts, and a notification of a public meeting to be held in Crouch, Idaho were posted twice in the Idaho Statesman and the Idaho World. A public meeting was held at the Garden Valley Senior Center, Garden Valley, Idaho on October 28, 1998 to present the main findings of the draft document and to answer questions from the community.

A total of nine written comments were received from interested agencies and stakeholders, including one comment signed by 23 individuals living and working within the Middle Fork Payette Sub-basin. All comments received were reviewed and discussed both internally and with the commenting party when possible. Comments were received from the following agencies, organizations, companies, and individuals:

Environmental Protection Agency
USDA Forest Service, Boise National Forest
Idaho Department of Lands
Idaho Department of Fish and Game
Idaho Conservation League/Idaho Rivers United
Intermountain Forest Industry Association
Boise Cascade Corporation
Garden Valley Residents
Herb Malany, South West Basin Advisory Group

The following is a list of comments received during the 45 day public comment period by the IDEQ. Please note that the comment listed may not be verbatim. Each comment is followed by a response which includes whether the comment was incorporated into the final Middle Fork Payette Sub-basin Assessment and TMDL (final TMDL).

Tim Hamlin, US Environmental Protection Agency, Region 10

 The target loads must be linked to water quality standards along with a demonstration on how these target loads will fully support beneficial uses.

The IDEQ acknowledges that an understanding of the linkages between narrative water quality standards and beneficial use support is required before beneficial use support can be achieved. However, limited or inappropriate data, coupled with time constraints, allowed only partial linkages to be developed for inclusion within the final TMDL. In order to address concerns that the final TMDL submitted to the EPA by the IDEQ

provides inadequate linkages, an additional section is included which outlines on going efforts to determine current conditions and improved linkages within the sub-basin.

2. Establish measurable targets so that responsible agencies and/or landowners will be able to decide where, how and by how much to reduce sediment.

The final TMDL establishes hillslope (i.e., land manager/owner) targets for the contributing areas of each impaired reach. These are presented in terms of a "percent above background" and tons/year based on background sediment production rates as estimated by BoiSed. In order to address concerns that the final TMDL submitted to the EPA by the IDEQ provides inadequate benchmarks for target attainment, an additional section is included which outlines an implementation plan development strategy. The Watershed Advisory Group, along with designated responsible management agencies, is the designated entity required to develop the Implementation Plan and to ensure target attainment (i.e., beneficial use support).

 If there are areas where increasing the sediment load to the target percent above background would degrade existing quality, the State of Idaho Antidegredation Policy would need to be met.

Changes have been made in the final TMDL document to specify that land use activities within the Middle Fork Payette Sub-basin will continue to be conducted so that they comply with the State of Idaho Antidegredation Policy as stated in IDAPA 16.01.02.051.

The TMDL lacks an identifiable load allocation.

The say the second of the second

TMDLs are defined in 40 CFR Part 130 as the sum of the individual Waste Load Allocation (WLA) for point sources and Load Allocation (LA) for nonpoint sources, including a margin of safety (MOS) and natural background conditions. The final TMDL submitted to the EPA by the IDEQ established Load Allocations (i.e., for nonpoint sources), a margin of safety, and natural background conditions for each of the impaired reaches in terms of a "percent above background" and tons/year based on background sediment production rates as estimated by BoiSed.

 The TMDL needs to consider all available data, such as the bacteria data collected in 1997, to make status calls using the Water Body Assessment Guidance.

The IDEQ evaluated the support status for all beneficial uses within the Middle Fork Payette Sub-basin by using the most complete data available at the time of document development. All water body assessments were made using available data received as a result of requests submitted to multiple agencies (e.g., USDA Boise National Forest, Boise Cascade Corp., IFG, IDWR, BOR, and USGS) on July 11, 1997 and are available in the IDEQ document support files. One bacteria samples was taken on September 11, 1997 that showed 560/100 ml colonies of fecal coliform. This level exceeds the primary contact recreation criteria for no more than 500/100 ml colonies of fecal coliform at any time. Since duration and frequency of the criteria exceedence is unknown, and the sample collected was found to be within 12% of the criteria, it was determined that this exceedence was minor and therefore does not downgrade the beneficial use.

6. The IDEQ must assess use support prior to removal from the 303(d) list, e.g., salmonid spawning in Scriver and Anderson Creeks.

The reason for the "Not Assessed" support status call for salmonid spawning on Scriver and Anderson Creeks is available in the IDEQ document support files. These two water bodies have a revised assessment

5 1

of "Full Support" in the final TMDL document.

7. Present data to backup the full support of salmonid spawning status call in the lower Middle Fork Payette River.

These data are not available for those sections of the Middle Fork Payette River, and thus forces the IDEQ to make this assessment based on best professional judgement. The Data Gaps section within the final TMDL discusses these issues in more detail.

8. Please explain or clarify how the TMDL accounts for seasonal variation and critical conditions.

The Clean Water Act Section 303(d) specifies that, for those waters identified as water quality limited, a TMDL must be established "at a level necessary to implement the applicable water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning that relationship between...these...limitations and water quality" (emphasis added). The final TMDL proposed by the IDEQ meets these requirements by establishing sediment targets in terms of a "percent above background" based on the bankfull discharge from the Middle Fork Payette River resolved into an estimated annual background and current annual sediment load. This means that the allocations established by this TMDL are in terms of a percent above background of the annual sediment load. Flexibility to quantify the load capacity and allocations in annual verses daily sediment loads is provided in 40 CFR Part 130.2(i). Note that the Middle Fork Payette River is an unregulated system, flows occur according to seasonal patterns and annual variations. Therefore, the annual allocations established reflect the Middle Fork Payette seasonal patterns and annual variations due to the flexibility inherent in evaluating the sediment yield in terms of a "percent above background".

- 9. Include the basis for stream listings on the 303(d)list early in the sub-basin assessment. Changes have been made in the final TMDL document to address this comment.
- 10. What was the basis for subwatershed ranking? How do these rankings fit into the sediment source assessment?

Changes have been made in the final TMDL document to address this comment.

- 11. Include a table which identifies both hill slope delivery and surface erosion delivery rates. Changes have been made in the final TMDL document to address this comment.
- 12. Where is streambank erosion active and what percentage of the sediment load is from bank erosion?

Changes have been made in the final TMDL document to address this comment.

- 13. Clarify monitoring by landowners, what and how do they interpret data? Changes have been made in the final TMDL document to address this comment.
- 14. The TMDL should establish a framework which specifically outlines the elements that need to be evaluated by land managers. These might include: surface and fluvial erosion and mass

failure risk from proposed and existing impacts.

Changes have been made in the final TMDL document to address this comment.

- 15. The TMDL should estimate the existing and potential sources of sediment in the watershed to conceptualize the present condition of the river and establish the load reduction needed. The IDEQ acknowledges that an understanding of the linkages between sediment sources and the present condition of the Middle Fork Payette River is required to identify specific actions for TMDL target attainment. In order to address concerns that the final TMDL submitted to the EPA by the IDEQ provides inadequate linkages, an additional section is included which outlines on going efforts to determine current conditions and an improved understanding of the linkages within the sub-basin.
- 16. The TMDL needs to list all limitations and assumptions used in the loading analysis.

 Changes have been made in the final TMDL document to address this comment.
- 17. The TMDL needs to fully explain the modeling analysis and assumptions and qualify and quantify the effects theses assumptions have on the certainty of output.

 Changes have been made in the final TMDL document to address this comment.
- 18. Please explain why the Parker model was used for a sand bed streams. Changes have been made in the final TMDL document to address this comment.
- Please explain why a 10% margin of safety is adequate.
 Changes have been made in the final TMDL document to address this comment.

20. Update surface erosion estimates from SedMod to represent current conditions. In order to address concerns that the final TMDL submitted to the EPA by the IDEQ provides an inadequate current condition assessment, an additional section is included which outlines on going efforts to determine current conditions within the Middle Fork Payette River sub-basin.

David Rittenhouse, USDA Forest Service, Boise National Forest

 An appropriate description of "excess sediment" and "majority of roads in poor shape" is needed.

Changes have been made in the final TMDL document to address this comment.

The proposed feedback loop needs to be improved. Pool or riffle monitoring is recommended.

The final TMDL establishes hillslope (i.e., land manager/owner) targets for the contributing areas of each impaired reach. These are presented in terms of a "percent above background" and tons/year based on background sediment production rates as estimated by BoiSed. In order to address concerns that the final TMDL submitted to the EPA by the IDEQ provides inadequate benchmarks for target attainment, an additional section is included which outlines an implementation plan development strategy.

3. The TMDL needs an identifiable endpoint for the implementation of BMPs and the desired

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future condition.

In order to address concerns that the final TMDL submitted to the EPA by the IDEQ provides inadequate benchmarks for target attainment, an additional section is included which outlines an implementation plan development strategy. This section includes how Watershed Advisory Group members, along with designated responsible management agencies, are to ensure target attainment (i.e., beneficial use support). These may include, but might not be limited to, identifiable endpoints and the desired future condition for the impaired reaches within the sub-basin.

4. The TMDL needs to allow short term increases in sediment for the purpose of achieving long term sediment reduction goals.

Changes have been made in the final TMDL document to address this comment.

- 5. Lower elevation private land should also be held accountable for sediment reductions. Changes have been made in the final TMDL document to address this comment.
- 6. The IDEQ should be responsible for operation of the feedback loop and related monitoring. The IDEQ expects to continue to be involved as the Middle Fork Payette TMDL is implemented as one of the designated responsible agencies as specified in Idaho Code Title 39, Chapter 36 and IDAPA 16.01.02. Additionally, the TMDL submitted to the EPA by the IDEQ contains an added section which outlines a suggested implementation plan development strategy. Specific feedback loops to show instream progress towards beneficial use support may be included in the Middle Fork Payette Implementation Plan.

Bill Love, Idaho Department of Lands

current conditions within the sub-basin.

- 1. Modeling efforts do not reflect current conditions in the watershed.

 The IDEQ acknowledges that an understanding of the current conditions is required before specific actions for TMDL target attainment can be identified. However, limited or inappropriate data, coupled with time constraints, allowed only a partial understanding of current conditions to be included within the final TMDL. In order to address concerns that the final TMDL submitted to the EPA by the IDEQ provides an inadequate current conditions assessment, an additional section is included which outlines on going efforts to determine
- 2. The TMDL does not provide a means of testing whether or not sediment targets are attained. The final TMDL establishes hillslope (i.e., land manager/owner) targets for the contributing areas of each impaired reach. These are presented in terms of a "percent above background" and tons/year based on background sediment production rates as estimated by BoiSed. In order to address concerns that the final TMDL submitted to the EPA by the IDEQ provides inadequate benchmarks for target attainment, an additional section is included which outlines an implementation plan development strategy.
- 3. Amend TMDL to specify CWE as the tool to identify forested landscape problems. The CWE process should also be used to design management practices to correct problems and improve water quality.

Changes have been made in the final TMDL document to address this comment.

- The TMDL should use the IDEQ beneficial use support status as the target.

 The final TMDL establishes hillslope (i.e., land manager/owner) targets for the contributing areas of each impaired reach. These are presented in terms of a "percent above background" and tons/year based on background sediment production rates as estimated by BoiSed. Attainment of these targets and/or full support of beneficial uses will indicate that the TMDL has been adequately implemented.
- 5. The IDL does not support the requirement that land managers and land owners be responsible for evaluating sediment production rates in terms of "percent above background".

The Clean Water Act Section 303(d) and 40 CFR Part 130.2 defines the pollutant load capacity for a water quality limited water body as the maximum amount of pollution allowed at a designated time and place. This suggests that technical assessment and load allocations that make up the load capacity must be presented in terms of a "mass/time", or some other method of measurement, to ensure that the load capacity is not exceeded. The final TMDL proposed by the IDEQ meets these requirements by establishing sediment targets within the Middle Fork Payette Sub-basin Assessment and TMDL in terms of a "percent above background" based on the bankfull discharge from the Middle Fork Payette River resolved into an estimated annual background and current annual sediment load. This means that the allocations established by this TMDL are in terms of a percent above background of the annual sediment load.

6. Reasonable assurance of nonpoint source reductions from this TMDL is not possible because 1) the sources have not been adequately identified, 2) description of the actual amounts of the sediment pollutant is lacking, and 3) no way is identified to measure whether the pollutant is being reduced.

The final TMDL establishes hillslope (i.e., land manager/owner) targets for the contributing areas of each impaired reach. These are presented in terms of a "percent above background" and tons/year based on background sediment production rates as estimated by BoiSed. In order to address concerns that the final TMDL submitted to the EPA by the IDEQ provides inadequate benchmarks for target attainment, an additional section is included which outlines an implementation plan development strategy.

- 7. Sediment targets for Pyle and Scriver Creek sub-watersheds are not reasonable. The final Middle Fork Payette Sub-basin Assessment and TMDL submitted to the EPA by the IDEQ specifies load capacities, target nonpoint management load allocations, margin of safety, and background loads for each of the contributing areas to the impacted reaches only. This reflects a change between the draft TMDL and the final TMDL submitted. By providing targets in terms of a "percent above background" cumulatively for each of the impaired reaches only, the sediment targets for Pyle and Scriver Creek subwatersheds are to be examined in combination with other areas and tributaries which contribute sediment to the impaired reaches. Because these allocations are for the entire contributing area of each of the impaired reaches, the IDEQ expects the issue of sediment management for each land use within each contributing area to be resolved in a cooperative manner during the implementation phase of the final Middle Fork Payette Sub-basin Assessment and TMDL.
- 8. It is unreasonable to expect land management agencies to adjust their activities for annual weather patterns.

The Clean Water Act Section 303(d) specifies that, for those waters identified as water quality limited, a

TMDL must be established "at a level necessary to implement the applicable water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning that relationship between....these....limitations and water quality" (emphasis added). The final TMDL proposed by the IDEQ meets these requirements by establishing sediment targets in terms of a "percent above background" based on the bankfull discharge from the Middle Fork Payette River resolved into an estimated annual background and current annual sediment load. This means that the allocations established by this TMDL are in terms of a percent above background of the annual sediment load. Flexibility to quantify the load capacity and allocations in annual verses daily sediment loads is provided in 40 CFR Part 130.2(i). Note that the Middle Fork Payette River is an unregulated system, flows occur according to seasonal patterns and annual variations. Therefore, the annual allocations established reflect the Middle Fork Payette seasonal patterns and annual variations due to the flexibility inherent in evaluating the sediment yield in terms of a "percent above background".

 Additional specific comments on the draft Problem Assessment and TMDL for the Middle Fork Payette.

Changes have been made in the final TMDL document to address these comments.

Scot Grunder, Idaho Department of Fish and Game

1. Empirical evidence to support the statement that the current sediment load within the basin is a result of recent landslide activity needs to be included.

Changes have been made in the final TMDL document to address this comment.

The TMDL needs to clearly separate out hatchery stocks of rainbow trout from indigenous rainbow trout.

Changes have been made in the final TMDL document to address this comment.

 The TMDL needs to state how habitat improvements will be documented if there are no plans to measure sediment load changes in specific stream habitat features (e.g., pools, spawning gravels, etc.).

The final TMDL establishes hillslope (i.e., land manager/owner) targets for the contributing areas of each impaired reach. These are presented in terms of a "percent above background" and tons/year based on background sediment production rates as estimated by BoiSed. Attainment of these targets and/or full support of beneficial uses will indicate that the TMDL has been adequately implemented. In order to address concerns that the final TMDL submitted to the EPA by the IDEQ provides inadequate benchmarks for target attainment, an additional section is included which outlines an implementation plan development strategy.

4. The sources of sediment must be managed and arrested first, artificial habitat structures should only occur as a last resort.

The final TMDL establishes hillslope (i.e., land manager/owner) targets for the contributing areas of each impaired reach. These are presented in terms of a "percent above background" and tons/year based on background sediment production rates as estimated by BoiSed. An additional section in the final TMDL includes how Watershed Advisory Group members, along with designated responsible management agencies,

are to ensure target attainment (i.e., beneficial use support). The IDEQ expects the issue of sediment management and beneficial use attainment to be resolved in a cooperative manner during the implementation phase of the final Middle Fork Payette Sub-basin Assessment and TMDL.

5. Point out in Appendix A that, while there are factors affecting fish populations other than habitat (e.g., exotic fish species, loss of anadromous fish, and hatchery stockings), the native fish species can more than hold their own against exotic brook trout if habitat is intact.
Changes have been made in the final TMDL document to address this comment.

Scott Brown, Idaho Conservation League; Marti Bridges, Idaho Rivers United

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 TMDL fails to establish any benchmarks by which to mark progress toward fully supporting beneficial uses.

The final TMDL establishes hillslope (i.e., land manager/owner) targets for the contributing areas of each impaired reach. These are presented in terms of a "percent above background" and tons/year based on background sediment production rates as estimated by BoiSed. In order to address concerns that the final TMDL submitted to the EPA by the IDEQ provides inadequate benchmarks for target attainment, an additional section is included which outlines an implementation plan development strategy.

2. Adoption of stream morphology goals is the proper approach to addressing uncertainty with sediment loading.

The Clean Water Act Section 303(d) specifies that, for those waters identified as water quality limited, a TMDL must be established "at a level necessary to implement the applicable water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning that relationship between...these...limitations and water quality". The final TMDL proposed by the IDEQ meets these requirements by establishing sediment targets in terms of a "percent above background" based on the bankfull discharge from the Middle Fork Payette River resolved into an estimated annual background and current annual sediment load. This means that the allocations established by this TMDL are in terms of a percent above background of the annual sediment load. Flexibility to quantify the load capacity and allocations in annual verses daily sediment loads is provided in 40 CFR Part 130.2(i). The final TMDL includes an added section which outlines an implementation plan development strategy. This section includes how Watershed Advisory Group members, along with designated responsible management agencies, are to ensure target attainment (i.e., beneficial use support). Target attainment may include specific feedback loops and/or river morphology goals to show instream progress towards beneficial use support.

3. TMDL does not establish a link between up slope management goals and downstream beneficial use impairment.

In order to address concerns that the final TMDL submitted to the EPA by the IDEQ provides inadequate linkages, an additional section is included which outlines on going efforts to determine current conditions and improved linkages within the sub-basin.

4. A feedback mechanism involving number of pools per mile in the lower reach of the river is needed to determine progress towards beneficial use support.

The final TMDL includes an added section which outlines an implementation plan development strategy.

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. Best of the same This section includes how Watershed Advisory Group members, along with designated responsible management agencies, are to ensure target attainment (i.e., beneficial use support). Target attainment may include specific feedback loops and/or river morphology goals to show instream progress towards beneficial use support.

- 5. River morphology must be considered to improve sediment impairment of the river. The final TMDL establishes hillslope (i.e., land manager/owner) targets for the contributing areas of each impaired reach. These are presented in terms of a "percent above background" and tons/year based on background sediment production rates as estimated by BoiSed. In order to address concerns that the final TMDL submitted to the EPA by the IDEQ provides inadequate benchmarks for target attainment, an additional section is included which outlines an implementation plan development strategy. The Watershed Advisory Group, along with designated responsible management agencies, is the designated entity required develop the Implementation Plan and to ensure target attainment (i.e., beneficial use support).
- 6. Clearly define, explain, and seek to fill data gaps.

 An additional section added to the final TMDL document outlines a suggested implementation plan development strategy. This section also includes on going efforts to provide an improved understanding of current conditions, fill data gaps, and provide information required for Implementation Plan development.
- 7. Utilization of BURP monitoring on a very few stations is a weakness.

 The IDEQ utilized a total of fifteen BURP monitoring stations within the Middle Fork Payette Sub-basin. This number of BURP stations is consistent with the number of stations per sub-basin state wide.
- 8. The IDEQ must adopt a cooperative, but specific and time certain, schedule with other agencies to generate the needed data and divide the work.

The IDEQ expects to continue to be involved as the Middle Fork Payette TMDL is implemented as one of the designated responsible agencies as specified in Idaho Code Title 39, Chapter 36 and IDAPA 16.01.02. Additionally, the TMDL submitted to the EPA by the IDEQ contains an added section which outlines an implementation plan development strategy. Specific activities associated with implementing the final TMDL and attaining beneficial use support are expected to be included in the Middle Fork Payette Implementation Plan. The Watershed Advisory Group, along with designated responsible management agencies, is the designated entity required develop the Implementation Plan and to ensure target attainment (i.e., beneficial use support).

9. Water Body Assessments in the TMDL should not have ignored habitat indices for BURP monitoring.

The IDEQ evaluated the support status for all beneficial uses within the Middle Fork Payette Sub-basin by using the most complete data available at the time of document development. Habitat indices were not ignored, but were placed lower in the decision tree (i.e., other data sets were looked before habitat). However, habitat indices are used to determine salmonid spawning use support.

10. No assessment of salmonid spawning for several Middle Fork Payette River tributaries. The IDEQ evaluated the support status for all beneficial uses within the Middle Fork Payette Sub-basin by using the most complete data available at the time of document development. The final TMDL reflects

additional support status analysis that was unable to be completed in time for the draft TMDL document. Salmonid spawning was assessed for each of the 1996 303(d) listed tributaries.

11. TMDL should apply to all currently listed 303(d) segments and should address both existing and designated beneficial uses.

The final TMDL addresses all segments that are both on the 1996 303(d) list and found to be water quality limited. Segments that have allocations established by the final TMDL document are those reaches located in the lower portion of the Middle Fork Payette River below Big Bulldog Creek. The tributaries to these lower reaches have been determined to not be water quality limited (i.e., impaired) due to sediment because they rapidly transport elevated sediment loads, without showing much change to either the macroinvertebrate populations, fish populations, or channel morphology. Therefore, these tributaries have been determined to be sources of sediment, but not water quality limited due to sediment.

12. Streams identified as being cleaner than that required by the water quality standards must not be degraded below their current condition.

Changes have been made in the final TMDL document to specify that land use activities within the Middle Fork Payette Sub-basin will continue to be conducted so that they comply with the State of Idaho Antidegredation Policy as stated in IDAPA 16.01.02.051.

 It is unacceptable to trade sediment delivery between watersheds to allow a sub-basin load goal to be met.

The final TMDL submitted to the EPA by the IDEQ establishes pollutant load capacities, nonpoint management load allocations, margin of safety, and background loads for the contributing areas for each of the impaired reaches of the Middle Fork Payette River. The final TMDL submitted specifies that land use activities within the Middle Fork Payette Sub-basin will continue to be conducted so that they comply with the State of Idaho Antidegredation Policy as stated in IDAPA 16.01.02.051.

- 14. Inadequate objectives are proposed within the TMDL to attain bull trout support. The TMDL submitted to the EPA by the IDEQ contains an added section which outlines an implementation plan development strategy. Specific feedback loops to show instream progress towards beneficial use support are expected to be included in the Middle Fork Payette Implementation Plan. The IDEQ expects these issues to be further resolved during the implementation phase of the final TMDL and during the development of the Bull Trout Recovery Plan through the South West Basin Native Fish Watershed Advisory Group.
- 15. Stream and habitat objectives must be met before deletion from the 303(d) list. The IDEQ evaluated the support status for all beneficial uses within the Middle Fork Payette Sub-basin by using the most complete data available at the time of document development. Habitat indices were not ignored, but were placed lower in the decision tree (i.e., other data sets were looked before habitat).
- 16. Establish measurable substrate goals.

The final TMDL establishes hillslope (i.e., land manager/owner) targets for the contributing areas of each impaired reach. These are presented in terms of a "percent above background" and tons/year based on background sediment production rates as estimated by BoiSed. In order to address concerns that the final

TMDL submitted to the EPA by the IDEQ provides inadequate benchmarks for target attainment, an additional section is included which outlines an implementation plan development strategy. The Watershed Advisory Group, along with designated responsible management agencies, is the designated entity required develop the Implementation Plan and to ensure target attainment (i.e., beneficial use support).

17. TMDL must address temperature problems which may limit bull trout recovery.

None of the data currently available show exceedences of the Idaho water quality criteria for temperature.

Dave Mabe, Intermountain Forest Industry Association

 Sediment allocation should be clarified to state that all sources of nonpoint pollution are required to reduce to a percent over background.

Changes have been made in the final TMDL document to address this comment.

2. Improve landslide estimates in the TMDL.

The IDEQ acknowledges that an understanding of the current conditions (including landslide activities) is required before specific actions for TMDL target attainment can be identified. However, limited or inappropriate data, coupled with time constraints, allowed only a partial understanding of current conditions to be included within the final TMDL. In order to address concerns that the final TMDL submitted to the EPA by the IDEQ provides an inadequate current conditions assessment, an additional section is included which outlines on going efforts to determine current conditions within the sub-basin.

 Mention that CWE and/or SedMod will be used to identify landscape treatments needed, improve sediment load estimates and address background sediment issues in the implementation phase.

Changes have been made in the final TMDL document to address this comment.

4. A more defined discussion of the next step in the creation of an implementation plan is needed.

An additional section added to the final TMDL document outlines an implementation plan development strategy. This section includes how Watershed Advisory Group members, along with designated responsible management agencies, will clarify how monitoring, data analysis, and subsequent document revisions will be conducted.

Domoni Glass, Boise Cascade Corporation

1. The TMDL must link land use and the pollutant of concern.

The IDEQ acknowledges that an understanding of the linkages between narrative water quality standards and beneficial use support is required before beneficial use support can be achieved. However, limited or inappropriate data, coupled with time constraints, allowed only partial linkages to be developed for inclusion within the final TMDL. In order to address concerns that the final TMDL submitted to the EPA by the IDEQ provides inadequate linkages, an additional section is included which outlines on going efforts to determine current conditions and improved linkages within the sub-basin.

2. A sediment budget needs to be developed for the Middle Fork Payette Sub-basin which

includes non forestry land uses. The final Middle Fork Payette Sub-basin Assessment and TMDL establish load capacities, target nonpoint management load allocations, margin of safety, and background loads for each of the contributing areas to the impacted reaches, and are not specified for forestry land uses only (i.e., the entire contributing area is considered in these allocations, regardless of the type of land use present). The IDEQ acknowledges that better information on current conditions are required before specific actions for target attainment can be developed. The final TMDL submitted to the EPA by the IDEQ contains an added section which outlines on going efforts to determine current conditions in the watershed and provides an implementation plan development strategy. The Watershed Advisory Group, along with designated responsible management agencies, is the designated entity required develop the Implementation Plan and to ensure target attainment (i.e., beneficial use support).

The IDEQ must commit to assisting land owners develop sediment budget in the 3. implementation plan.

The IDEQ expects to continue to be involved as the Middle Fork Payette TMDL is implemented as one of the designated responsible agencies as specified in Idaho Code Title 39, Chapter 36 and IDAPA 16.01.02. Additionally, the TMDL submitted to the EPA by the IDEQ contains an added section which outlines on going efforts to determine current conditions in the watershed.

- The IDEQ must be involved in addressing unregulated land uses. The IDEO expects to continue to be involved as the Middle Fork Payette TMDL is implemented as one of the designated responsible agencies as specified in Idaho Code Title 39, Chapter 36 and IDAPA 16.01.02.
- The current conditions described in Appendix B should be brought into the text. Changes have been made in the final TMDL document to address this comment.
- 6. The TMDL should provide a vehicle for de-listing improperly listed streams and should be used as such

Changes have been made in the final TMDL document to address this comment.

- It is inappropriate to set targets for unlisted tributary streams. 7. Changes have been made in the final TMDL document to address this comment.
- The TMDL needs to cite on going efforts that will be used to address sediment concerns in 8. the basin.

Changes have been made in the final TMDL document to address this comment.

- osy**in** en kaliferan a **kali**ena a sa 9. The TMDL needs language which clearly states that the targets are subject to change and that the management practices adopted may also change in response to new information. Changes have been made in the final TMDL document to address this comment.
- The TMDL should provide enough information to support de-listing, if appropriate, hence 10. the logic that removed segments from the list.

Changes have been made in the final TMDL document to address this comment.

- 11. The geology map within the TMDL needs to be improved.

 Changes have been made in the final TMDL document to address this comment.
- 12. The TMDL document needs a sub-basin map with township and range lines, Crouch and stream names.

Changes have been made in the final TMDL document to address this comment.

- 13. The TMDL needs to further explain the steps taken to arrive at the loads and reductions. Changes have been made in the final TMDL document to address this comment.
- 14. Additional information on background and management related landslides needs to be provided.

Changes have been made in the final TMDL document to address this comment.

15. The effect of data collected after a 50 year event has on the modeling conducted needs to be described.

Changes have been made in the final TMDL document to address this comment.

16. A margin of safety is not needed.

The Clean Water Act, Section 303(d) specifies that, for those waters identified as water quality limited, a TMDL must be established "at a level necessary to implement the applicable water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning that relationship between...these...limitations and water quality" (emphasis added). The IDEQ attempts to meet these requirements by establishing sediment targets within the final TMDL in terms of a "percent above background" amount for all flows within the Middle Fork Payette River with a margin of safety. The IDEQ expects these targets will be adjusted over time as progress to beneficial use support is attained. The iterations required in this approach suggest that a conservative approach in establishing the initial sediment targets is needed. The IDEQ asserts that if these targets are attained, the support of the beneficial uses will improve.

17. Additional specific comments provided on the Draft Middle Fork Payette Sub-basin Assessment and TMDL.

4.41

Changes have been made in the final TMDL document to address this comment.

Garden Valley Residents

1. Costs to attain beneficial use support must be reasonable.

The Middle Fork Payette TMDL establishes sediment targets for land managers in terms of a "percent above background" amount for each of the impaired reaches. Attainment of these targets and/or full support of beneficial uses will indicate that the TMDL has been adequately implemented. The IDEQ expects that Watershed Advisory Group members, along with designated responsible management agencies, shall ensure sediment target attainment and/or beneficial use support within the impaired reaches of the Middle Fork

Payette River, and may conduct a cost analysis for target attainment.

- 2. An acceptable assurance of success is needed within the TMDL document. The IDEQ acknowledges that better information on the linkages between land uses and narrative water quality standards and beneficial use support is required before beneficial use support and/or TMDL targets can be achieved. However, limited or inappropriate data and time constraints did not allow improved linkages to be developed for inclusion within the final TMDL. In order to address this concern, the TMDL submitted to the EPA by the IDEQ contains an added section which outlines on going efforts to determine current conditions within the Middle Fork Payette River Sub-basin.
- 3. Other resource interests (e.g., recreation) must also be protected.

 The Middle Fork Payette TMDL establishes sediment targets for land managers in terms of a "percent above background" amount. Attainment of these targets and/or full support of beneficial uses will indicate that the TMDL has been adequately implemented. The IDEQ expects that Watershed Advisory Group members, along with designated responsible management agencies, shall ensure sediment target attainment and/or beneficial use support within the impaired reaches of the Middle Fork Payette River in such as way as to accommodate other resource interests within the sub-basin.
- 4. Acceptable levels of sediment should not be based on arbitrary percent above background numbers.

The IDEQ acknowledges that an understanding of the linkages between narrative water quality standards and beneficial use support is required before beneficial use support can be achieved. However, limited or inappropriate data, coupled with time constraints, allowed only partial linkages to be developed for inclusion within the final TMDL. In order to address concerns that the final TMDL submitted to the EPA by the IDEQ provides inadequate linkages, an additional section is included which outlines on going efforts to determine current conditions and improved linkages within the sub-basin.

Herb Malany, South West Basin Advisory Group

 Develop a guidance pamphlet referencing existing laws, rules, procedures, protocols for the implementation phase.

An additional section added to the final TMDL document outlines an implementation plan development strategy. This section includes how Watershed Advisory Group members, along with designated responsible management agencies, will clarify how monitoring, data analysis, and subsequent document revisions will be conducted.

Need feedback guidance to establish acceptable goals.

The final TMDL establishes hillslope (i.e., land manager/owner) targets for the contributing areas of each impaired reach. These are presented in terms of a "percent above background" and tons/year based on background sediment production rates as estimated by BoiSed. Attainment of these targets and/or full support of beneficial uses will indicate that the TMDL has been adequately implemented. In order to address concerns that the final TMDL submitted to the EPA by the IDEQ provides inadequate benchmarks for target attainment, an additional section is included which outlines an implementation plan development strategy.

3. Use English units of measure.
Changes have been made in the final TMDL document to address this comment.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION 10

IDAHO OPERATIONS OFFICE 1435 N. Orchard St. Boise, Idaho 83706

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April 12, 1999

DIVISION OF ENVIRONMENTAL QUALITY BOISE REGIONAL OFFICE

Michael McIntyre
Idaho Division of Environmental Quality
1410 North Hilton
Boise, Idaho 83706

Dear Mike,

We have completed our review of the Final Middle Fork Payette River Sediment TMDL, and per our conversation, I wanted to provide you our comments. In our review we found three aspects of the TMDL were deficient: the supporting rationale for the target; the application of the bedload model; and technical errors in the analysis. In addition, we do not agree that there is a sufficient basis to justify not writing TMDLs for Scriver and Anderson Creeks. These issues are explained in more detail below. Hopefully this will clarify our position, and provide a basis for further discussion.

Water Onality Target:

The TMDL recognizes that factors limiting beneficial use support include the lack of pools and excess fine gravel and coarse sand material (i.e, < 8 mm). A bed material deposition rate of 50% above background is used as an interim target to set the load allocations and margin of safety. No other surrogate measures are proposed (e.g., pool frequency or surface fines). As support for this target, the document cites the USDA Forest Service (USFS), Boise National Forest criteria which allows a 100% percent increase in sediment load to a critical reach. The remaining support includes a statement that the USFS believes 50% is conservative based upon unspecified observations, and a statement that ongoing IDEQ BURP analysis will provide a feedback loop to management.

TMDLs are required to be established at levels which meet water quality standards, including full support of beneficial uses, and achieving all applicable water quality standards. Our concerns with this target are as follows.

- As indicated in our previous comments on the draft TMDL, the TMDL does not clearly link the cause of impairment to the instream target, load reductions and beneficial use support;
- There does not appear to be any rationale as to why an increase in bed deposition rate of 50% above background would result in full support of beneficial uses;
 - The USFS criteria cited as support for the TMDL target is a target for sediment yield, which is much different than a bed deposition rate, and the USFS target itself is not linked to full support of beneficial uses it is simply a management target set below

levels clearly documented to be excessive; and

The bed deposition rate is not measurable, therefore there is no way to measure whether the target has been achieved or whether progress is being made.

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Ensuring that the target (and hence the allocations) will achieve water quality standards is likely the most critical element of a TMDL. Discussion on this point within the Middle Fork Payette TMDL is conflicting. For example, on page 41 the TMDL states "whether these improvements [50% above background] are great enough to meet beneficial use support, either on their own or through additional measures, is unknown at this time", whereas on page 44 the TMDL states "This TMDL establishes a sediment production threshold for the impaired reaches (R5, R6, and R7) that will achieve the Idaho water quality criteria for sediment and beneficial use support". Finally on page 46 the TMDL states "The IDEQ asserts that if these sediment targets are attained the support of the beneficial use will improve".

Considering that the linkage between the cause of impairment, load reductions and beneficial use support status has not been established, and since rationale to support that a 50% above background deposition rate will fully support beneficial uses is lacking, we have concluded that the TMDL does not provide assurance that the goals of the CWA and implementing regulations [40CFR130.7(c)(1)] would be met.

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Model Mis-application:

The TMDL analysis used the Parker (1982) bedload transport equation on the impaired reaches of the Middle Fork Payette River (i.e., R-5, 6, and 7). The Parker (1982) equation, developed from a gravel-bed stream (Parker and Klingeman, 1982), is intended for use in coarse gravel bed streams (Yang, 1996). The lower reaches of the MF Payette River are presently sand-bed reaches with distinct bedforms (i.e., d50 = 1.75 mm; dunes and upper regime plane-beds). Two critical assumptions of the Parker (1982) equation were violated in the TMDL loading analysis:

- 1) the TMDL analysis assumes that the bedload and pavement have the same particle size distributions, whereas field data show they are substantially different; and
- 2) the TMDL analysis assumes that no bedforms are present, whereas field data show they are present (dunes and upper regime plane-beds).

The Parker (1982) equation uses bed stress to estimate sediment transport potential. Parker and Klingeman (1982) pg. 1419 show how in sandbed streams the effective grain stress should be used rather than bed stress. Additionally, Wilcock (1998) demonstrates that the critical shear stress varies significantly between gravel and sand-bed streams. Yang (1996) states that Parker (1982) is appropriate for coarse gravel-bed streams and that the Yang and/or Ackers and White equations should be used for fine gravel and sand-bed streams.

Recent data collected as part of EPA/USFS/IDEQ monitoring (available prior to TMDL development) also support the above conclusion and demonstrates how the assumptions of Parker (1982) are violated. EPA data analysis and preliminary sediment transport modeling

demonstrate that the Parker (1982 and 1990) equations grossly over-predict (1000-3000%) sediment transport potential in the lower reaches (Fitzgerald and Borden, 1999), which may greatly underestimate the magnitude of the sediment deposition rate.

Beneficial Use Support Status:

Prior to TMDL development the IDEQ assessed the status of the listed waterbodies within the Middle Fork Payette River Subbasin. Readily available information was used to make the support status calls, resulting in an adequate evaluation of coldwater biota use support status, notwithstanding EPA concerns with the WBAG process. However, EPA provided written comments on the draft TMDL on November 18, 1998 regarding support status calls for salmonid spawning uses in the mainstern, Scriver, and Anderson Creeks, indicating that it was inappropriate for IDEQ to determine that these uses are "full support" without having and using supporting data. This approach was not changed in the final TMDL, and "full support" salmonid spawning status calls were used to remove these segments from the 303(d) list and to support not developing TMDLs for Scriver and Anderson Creeks. We could not approve such a basis for removing waters from the 303(d) list, and in our view, TMDLs for these segments are still expected pursuant to the Idaho TMDL, schedule.

Technical and Documentation Issues:

The following narrative briefly documents EPA's technical review of the TMDL. In summary, EPA found the analysis very difficult to track due to the lack of adequate explanation and literature citation of the analysis steps and results, and critical mistakes which appeared in the final document (e.g., wrong spreadsheets in the Appendix B). Based on the scientific literature and the measured characteristics of the impaired stream, EPA concludes that the Parker (1982) bedload transport equation was mis-applied. Finally, the response to comments failed to adequately address EPA's technical comments 16-20, and other comments submitted outside of EPA regarding the technical validity of the analysis (e.g., is the sediment stored in the lower mainstem episodic-or chronic, Idaho Fish and Game), which primarily address issues discussed below.

Documentation

The TMDL analysis uses methods well established in the scientific literature, however, this particular application requires substantial documentation and literature citation due to the complexity and uncertainty associated with the analysis. Because much of the documentation was lacking, it was necessary for EPA to spend considerable time reconstructing the analysis.

The following summarizes EPA's understanding of the analysis, to the best of our knowledge. First, the load capacity is defined in terms of a bed-material load deposition rate. The analysis assumes that water quality standards and beneficial uses will be maintained/met at a deposition rate of 50% above background, and instream targets, load capacities, allocations, and MOS are set using this assumption.

The sediment transport analysis uses sediment erosion models and bed-material transport equations. We constructed Figure 1 to illustrate our understanding of the general steps and process involved in the target and loading analyses. The TMDL analysis uses established field procedures and methods to collect data, a verified erosion model (i.e., BOISED) to define background input, and a verified bedload transport equation (Parker (1982)) to estimate the bedload deposition rate. Background hillslope erosion and delivery, and stream sediment yield are modeled using the USDA Forest Service model BOISED and a potential sediment delivery coefficient, respectively. Channel geometry, grain size distribution, and stream flow were measured in the field at seven sites. These data were input to the Parker (1982) bedload transport equation and used to estimate the sediment transport potential.

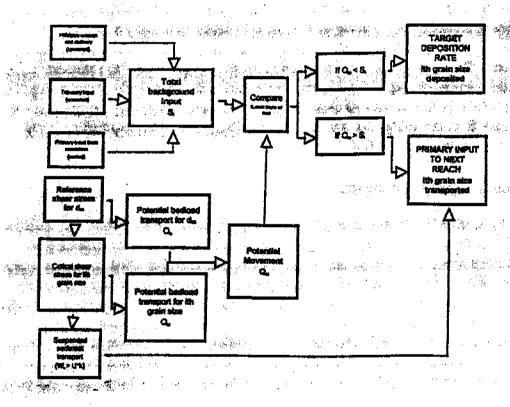


Figure 1. Sediment analysis framework.

Undocumented assumptions

The basic logic of this analysis appears sound, however, there is great uncertainty associated with the results which facilitates the need to rigorously document all of the assumptions. EPA determined that the following assumptions were made but were not documented in the final TMDL:

1) the bankfull discharge is the effective discharge initiating significant bed material transport and is responsible for the long-term average bed material load and configuration of the streambed:

- 2) the bankfull discharge has remained constant since human disturbance of the watershed;
 - 3) bankfull discharge only occurs once a year,
- 4) if the bankfull discharge does not move a particle of a given size fraction, then that particle remains deposited;
- 5) bedload transport occurs only at bankfull discharge;
- 6) given the three sediment inputs (Figure 1), no winnowing of fine sediment occurs on the hillslope, no selective transport occurs in the tributaries, and no particle abrasion occurs between reaches;
- 7) Parker (1982) assumes the bed material load and the pavement have similar particle size distribution;
- 8) smooth boundary conditions in the channel (Stoke's Law used for settling velocity); and
- 9) all the assumptions associated with Shield's critical shear stress apply.

Technical errors

As part of EPA's final review, we identified four critical technical errors in the overall analysis.

- Different background deposition rates are listed in the tables in the technical appendix (i.e., Table 4 (pg. B9); Tables 12e, f, & g (pgs. B24-26). After submittal of the final TMDL, it was discovered that Tables 12e, f, & g are not the correct tables.
- Second, the flow estimates from Manning's Equation appear to grossly overestimate bankfull discharge (i.e., measured = 1100 cfs; modeled 3000 cfs) which are used to estimate the normal depth, a component of the sediment transport equation. The percent difference between measured flow and predicted flow presented in Tables 12e, f, & g are actually about 100% rather than 0-12%.
- Stoke's Law was used to calculate particle settling velocity. According to Yang (1996)

 Stoke's Law is only valid for smooth boundary conditions. For transitional and rough boundary conditions another formula (e.g., Rubey's Equation) should be used to calculate the settling velocity.
 - Fourth, the reference shear stress (τ ") used in the analysis, which is a critical component of this type of analysis (Buffington and Montgomery, 1997), is estimated relative to existing conditions. In other words, all deposition rate targets are calculated relative to the existing condition. Methods used to calculate the deposition rate targets should be relative to the desired conditions.

I hope this has clarified our concerns with the final TMDL. Because some of the critical steps and assumptions in the TMDL are undocumented, please let us know if our summary of your analysis is not accurate.

We look forward to discussing this with you in the near future. If this raises more questions, or if there is additional detail you need, please contact me (378-5774) or Jim Fitzgerald (378-5753).

Sincerely,

Leigh Woodruff
TMDL Coordinator

cc: Steve West, IDEQ

References

- Buffington, J. M. and Montgomery, D.R., 1997. A systematic analysis of eight decades of incipient motion studies, with special reference to gravel bed rivers. Water Resources Research. Vol. 33, No. 8, pages 1993-2029.
- Parker, G. and Klingeman, P.C., 1982. On why gravel bed streams are paved. Water Resources Research. Vol. 18, No. 5, pages 1409-1423.
- Fitzgerald, J.K. and Borden C., 1999. Characterization of stream flow and sediment load of the Middle Fork Payette River Subbasin, Idaho using synoptic sampling techniques and empirical formulas. In proceedings from: ninth annual Nonpoint Source Water Quality Monitoring Results Workshop.
- Wilcock, P. R., 1998. Two-fraction model of initial sediment motion in gravel-bed rivers. Science. Vol. 280, April 17.
- Yang, C.T., 1996. Sediment Transport: theory and practice. McGraw-Hill Comp, Inc. ISBN 0-07-912265-5. pg. 262.

Discussion Points between Region 10 EPA and IDEQ on the Middle Fork Payette TMDL - Submitted December, 1998

Water Quality Targets

Issue 1: The TMDL does not clearly link the cause of impairment to the instream target, load reductions and beneficial use support.

Current support status assessment in the document state that migration and habitat needs of bulltrout are lacking within the lower reaches. Sediment load reductions will improve the conditions within the lower reaches. However, these load reductions alone may not provide all of the improvements needed at this time. The linkage between the current conditions and the suggested load reductions to the ultimate full support of beneficial uses is found in the document's feedback loop. It is the IDEQ's understanding the when the impairment to beneficial uses is due to nonpoint source activities a feedback loop with iteration is allowed, if not required. The final TMDL document allows for new loads to be established using a feedback loop that incorporates "surrogate" measurement of habitat needs of bulltrout within the impaired reaches.

Issue 2: The justification provided does not provide assurance that the goals of the CWA and implementing regulations [40CFR130.7(c)(1)] would be met.

The rational used to justify a bed deposition rate of 50% above background is based, in part, on the need for an iterative process to discover what the "true" total maximum sediment load may be. Additionally, this initial target is shown, in the final TMDL document, to be roughly half of the current sediment load within the Middle Fork Payette basin.

Issue 3: The bed deposition rate is not measurable, therefore, there is no way to measure whether the target has been achieved or whether progress is being made.

The TMDL sediment targets are hillslope sediment production rates. Land managers are to use the hillslope sediment production rates for the contributing areas listed in the document as the TMDL sediment target until the feedback loop or beneficial use support indicates it should be lowered or raised.

The sediment transport model was used to show the relationship between hillslope sediment rates and inputs to a reach and the changes to the transport out (and deposition of) an estimated amount of sediment. Flow and sediment amounts selected were used to characterize the relationship between background and target - under steady state conditions. Steady state conditions do not occur in natural systems. The modeling of sediment transport in natural systems (i.e. non-steady state) is not an exact science at this time.

Issue 4: Statements made in the final TMDL document that provide assurance that the targets and allocations will achieve water quality standards appears to be conflicting.

This issue stems primarily from editing mistakes rather than any inherent ambiguity within the TMDL's approach to water quality standard attainment. For example, the statement on page 41 was included within the TMDL to show how iteration will be required in order to achieve beneficial use support, the statement on page 44 was included to show how the narrative standard achievement and TMDL allocations are based primarily on professional judgement at this time, and, finally, the statement made on page 46 (and 44) that the beneficial use support will improve under these initial sediment TMDL targets is based on preliminary estimates that the current sediment load will be reduced by half.

Model Mis-Application

Issue 1: The streambed of the lower reaches of the Middle Fork Payette River are composed of sand sized particles and dune bedforms may be present. Therefore, form drag must be considered significant and the shear stress should be partitioned. It is suggested that the Ackers and White equation should be used.

The presence of sand dune bedforms may decrease the sediment transport rate due to the increase in form roughness relative to particle roughness. One sediment transport equation that takes dune formations into account is the Ackers and White equation. This is an empirical equation based on flume studies with a D50 of 0.9 mm. There are problems, however, in applying this equation to the Middle Fork Payette River For example, whether dune formations are present within the Middle Fork Payette River during flood flows is not able to be determined by observation. The water during these flows is too murky. Therefore, while dunes may be present, plane bed formations (which do not require partitioning) may also be present.

Another difficulty is that, because the Ackers and White equation is an empirical equation based on a D50 of 0.9 mm, this equation would tend to overestimate the effect of form drag for those situations where the D50 is greater (i.e. 1.75 mm), such as in the case of the Middle Fork Payette River. Current research being conducted by geomorphologists rely on the Parkers equation for those situations where there is any appreciable amount of gravel (personal communication by Ned Andrews, 1999). Specifically, the Parker equation is used for those systems where the D50 is between 2.5 and 28 mm, while the Ackers and White equation is used for those systems where the D50 is near 0.9 mm. Also, Parker Equation validation studies by Andrews and Nankervis (1995) showed that this was an appropriate model for streams with similar bedload (i.e. similar D50) (see sieve data attachments)

There appears to be no perfect equation for situations where the D50 is between 0.9 and 2.5 mm. Therefore, there may be no perfect equation for the lower reaches of the Middle Fork Payette River, where the D50 may be somewhere around 1.75 mm. And, while none of the laboratory flume studies conducted had different sizes for bedload and pavement, the Parker, 1982 equation has been validated extensively in natural systems (Andrews and Nankervis, 1995).

A later point brought up by the EPA states that the analysis for the TMDL must consider the desired conditions. The sand present in the lower reaches may be a huge, transient artifact of the 1997 storm and may not be there under target or background conditions. And, while we all hope that the sand bars in the lower reaches will be gone when the effects of the 1997 storm diminishes, there remains a great uncertainty as to what the conditions will be within these lower reaches when beneficial use support is achieved. This is one of the primary reasons why it is our recommendation that iterative or "phased" TMDL targets be established for the Middle Fork Payette.

And finally, we agree that the effect of particle size (and dune formation) on sediment transport is an important consideration. As one EPA comment suggested, this effect may be high as a 3000% change in sediment transport within the lower reaches. Therefore, an additional analysis was preformed to look at the effects of this on the ratio between background and target sediment rates. Results of this analysis showed that the impact of using one value of shear stress over another is not significant (see Qb/30 in the lower reach example).

Technical Documentation Issues:

Issue 1: EPA personnel found the analysis difficult to track. Incorrect spreadsheets were submitted in Appendix B of the TMDL document.

That, in the opinion of the EPA, the document's analysis was "poorly written" is more of an editorial complaint than a technical complaint. Additionally, IDEQ personnel were available to answer questions and to take edited copies of the draft TMDL by EPA reviewers up until the final document was submitted.

Also, the spreadsheets of the final document's appendix B were correct in the draft TMDL document and are available as document corrections. Again, this issue is an editorial mistake and is mis-labeled by the EPA as a technical mistake.

Issue 2: The response to comments failed to adequately address EPA's technical comments 16-20 regarding the technical validity of the analysis.

The response to EPA technical comments 16-20 were kept short in Appendix C of the final document for editorial reasons. More detailed responses, which include document excerpts, are available to the EPA and are included here.

Issue 3: A proposed a list of nine (9) assumptions which should have been cited in the final TMDL was submitted by the EPA on April 12, 1999 and should have been in the final document.

Of the nine (9) assumptions suggested by the EPA, the IDEQ agrees with the following:

- (1) The bankfull discharge is responsible for the long-term average (i.e. dominant) bed material and configuration of the streambed.
- (2) The estimate of bankfull discharge has a greater error associated with it than the amount of change due to management activities within the basin.
- (3) This was not assumed.
- (4) As shown by the sediment transport equation, if a particle does not move under bankfull discharge conditions, then that particle size remains deposited.
- (5) This was not assumed
- (6) No winnowing of hillslope input sediment particle sizes occurs (justified due to landslide input as the dominant input); no selective transport occurs in tributaries (justified for those reaches not impacted by flood plain development; and, no particle abrasion occur between reaches.
- (7) The bed material load and the bed pavement have similar particle size distribution.
- (8) This was not assumed (see below for explanation).

(9) Shield's critical shear stress assumptions apply.

Issue 4: EPA identified four critical technical errors in the overall analysis: 1) incorrect tables were included in Appendix B of the final document, 2) the bankfull flow, as estimated by the Manning's equation and used to estimate normal depth, appear to grossly overestimate bankfull discharge, resulting in a difference in percent flow of 106%, 3) Stoke's Law was incorrectly used to calculate particle settling velocity, and 4) methods used to calculate the deposition rate targets should be relative to the desired conditions.

Again, this first "critical technical error" is an editorial error and can be rectified easily with a correction.

The second "critical technical error" mistakenly assumes that the normal depth was estimated using the Manning's equation. A quick examination of the spreadsheet (in the EPA's possession since September, 1998) would have shown that the normal depth calculations are directly entered into the spreadsheet. In this case, these values are based on field measurements conducted by EPA and IDEQ personnel in August, 1998.

The third "critical technical error" mistakenly assumes that Rubey's equation was not used to calculate the settling velocity. Again, a quick examination of the spreadsheet, or a phone call to IDEQ personnel, would have shown the reviewer that Rubey's equation was in fact used (see fall velocity attachment).

The fourth "critical technical error" cites that the reference shear stress is a critical component of this analysis and that it is based, in this case, on existing conditions rather than on desired conditions. The IDEQ wishes to stress that the reference shear stress used in the Middle Fork Payette TMDL was selected carefully and according to validation work conducted in similar conditions by Andrews and Nankervis (1995), and is supported by other observed reference shear stress values for D50 near 1.75 mm (Buffington, 1999). In addition to these supporting documents, an additional analysis was conducted for an extreme reference shear stress value, as reported by Buffington and Montgomery (1997). It can be seen that for a reference shear stress value of 0.073 ($\tau^* = 0.073$), the impact to the final analysis results is small (reference shear stress example).

In the second portion of the fourth "critical technical error", it appears that the EPA's desire is to select a reference shear stress relative to the desired conditions of the stream channel. The first part of the IDEQ's response is that the reference shear stress example shows how the choice of the reference shear stress does not change the final results to a great extent. The second part of the IDEQ's response is, as mentioned above, the sand present in the lower reaches may be a huge, transient artifact of the 1997 storm and may not be there under target or background conditions. And, while we all hope that the sand bars in the lower reaches will be gone when the effects of the 1997 storm diminishes, there remains great uncertainty as to what the conditions will be within these lower reaches when beneficial use support is achieved. This is one of the primary reasons why it is our recommendation that iterative or "phased" TMDL targets be established for the Middle Fork Payette.

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Comparison between $\tau^*r = 0.0376$ and $\tau^*r = 0.072$

 	Suggested % abov	Background Rate of	Deposited at Target Rate of Suggested % above
Reach	Background		Target Rate of Suggested % above Deposit @ τ*, = 0.073 Background
1	50	10	15 Dackground
2	44	8	12
3	46 🔭	8	12
4	50	1	2
5	56	19	28 30
6	26	89	133
7	48	43	65 65

Comparison for reduction in transport capacity (Q_b/30)

	-			Deposited at
1	Suggested % abov	Background Rate of	Target Rate	of Suggested % above
Reach	Background	Deposit @ Q _b /30	Deposit @ Q	
7	48	225	338	347

Equation Used for Fall Velocity (see column K in spreadsheet) $= SQRT(2/3*D_i*g*(\rho_s - \rho))/\rho)$

		,				
	[Deam	σ_{q}	Pa	
Source	T-00-	A;	(mm)	(ф)	(kg/m³)	Particle characteristics
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Shields (1936b)	0.037	8.6	1.56	0.59	1060	Very angular amber cuttings
Sitietas (1990e)	0.037	8.7	1.56	0.59	1060	Very angular amber cuttings
		9.1	1.56	0.59	1060	Very angular amber cuttings
Shields (1936b) and Wheaton (?) (unpublished report.	0.042	14.3	1.77	0.78	1270	Subangular brown coai
a.d.)			1 % (A)		12.0	Consultation brown com
LO./	0.033	193	1.77	0.78	1270	Sabangular brown coal
high (1936h)	0.037	21.3	1.88	0.72	1270	Subangular brown coal
	0.038					
	0.049	37.4	2.53	0.56	1270	Subangular brown coal
Shields (1936b)	0.029	14,9	0.85	0.23	2700	Very angular crushed granite
	0.034	28.5	1.23	0.23	2700 [2710]	Very angular crushed granite
4	0.048	100	2.44	0.23		
	0.036	6.1	0.36	0.30		
	0.035	54.5	1.52	0.35		Angular crushed barite
	0.041	121	2.46	0.22		Angular crushed barite
	0.043	140	2.76	0.41		Angular crushed barita
	0.046	216	3.44	0.16		Angular crushed barite
illbert (1914)	(0.050)	(221)	(4.94)	<0.26		Subrounded to subangular gravels from the S
	(0.059)	(473)	(7.01)	<0.22	2650 [26 9 0]	ramento and American rivers
ramer (1932, 1935)	0.032	6.5	12.0	0.74	2650 [2700]	Well-rounded sand
	0.038	7.6	0,53	0.81	2650 [2700]	Well-rounded sand
	0.033	7.7	0.55	0.62	2650 [2700]	Well-rounded sand
asey (1935a,b)	0.067	1.9	0.17	0.41	2650	Subangular to subrounded river sand
	0.051	3.1	0.26	0.42	2650	#alliand NFReDiction in the part of the first terms of the first term
	0.034	10.4	0.67	0.16	2650	Subangular to subrounded river sand Subangular to subrounded river sand
	0.034	15.8	0.87	0.17	2650	Subangular to subrounded river sand
	0.037	18.1	0.93	0.19	2650	Subangular to substanted river tand
	0.040	30.2	1.27	0.20	2650	Substigular to sobrounded river sand
	0.041	49.2	1.74	0.19	2650	Subangular to subrounded river sand
	0.038		2.47	0.22	2630	Subsequent to subrounded giver sand
SWES (1935)	(0.051)		(0,21)	0.32	2650	Subangular to angular Mississippi River sand
	(0.045)	ani	(0.31)	0.53	2650	Subrounded to antiangular Okay Creak sand
	(0.038)		(0.35)	0.37	2650	Subrounded to subangular Mississippi River sa
	(0.034)	0.5		0.82	2650	Angular to subrounded crock sand
	(0.036)		(0.52)	0.53	2650	Subrounded to rounded Mississippi River same
	(0.036)	(7.9)	/n sa	0.66		Contraction to tournest oursessably Kivel 2818
A SECTION OF THE SECT	(nma)	(4:314	(4	A100	2030	Subengular to subrounded creek sand

Note: Values in rounded parentheses are for \tilde{D}_m , rather than D_{mn} ; see Table 1 note ρ , values in square brackets (Column 6) are actual sediment densities as reported by the original source, as opposed to those reported in Shields' [1936b.c. Fig. 6 (nonbracketed values)]; it is uncertain which of these two ρ , values were used in Shields' calculations. Roundness terms (Column 7) from Russell and Taylor (1937) and Powers (1953).

Buffington J.M The legend of A.F. Shirelds James of Hydrobyte Engineering April 1999 101 125 No 4 MEASURED TOTAL SEDIMENT LOADS

(SUSPENDED LOADS AND BEDLOADS)

FOR 93 UNITED STATES STREAMS

By Garnett P. Williams, U.S. Geological Survey,

and David L. Rosgen, Wildland Hydrology Consultants

U.S. GEOLOGICAL SURVEY

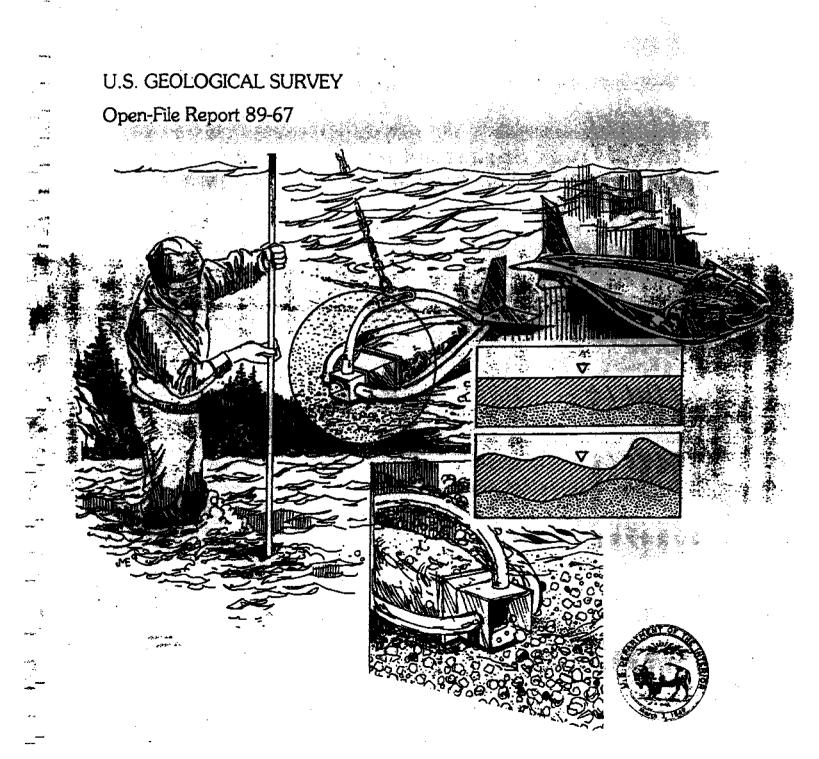
Open-File Report 89-67



Table 3. -- Bedload particle-size distributions -- Continued

	Pe	ccent by w	eight I	iper th	on Site	(4 (1) ti	seters)	indicat	ed 🚼	
Date 0.062 0.12	0.2	5 0.5	∦ .1	2	4	8	16	32	64	128
	<u>52.</u>	Mad Creek	(Site	3) near	Empire,	Colo.	5	: .		
06-06-84 06-18-84	2	7 10	24 38	49 62	71 81	87 95		100		ļ.
06-25-84 0 07-03-84	2	8 7	28 26	52 48	62 63	72 70	78 83	100 100		
07-12-84	0	** * 1	30	57	- 77 - 4	87	100			
<u>53.</u>	Midd	le Fock of	Boulde	r Creek	at Nede	rland,	Colo.		35 \ 35 \ \	1
05-14-84 05-17-84	ି ଓଡ଼ି ପ୍ର	9 22	32 56	55 78	* 82 100	95	100		1	
05-23-84 06-04-84 06-08-84	. o	20 10	50 30	70 60 100	90 90	100 100				
06-15-84	0) 11	28	44	67	83	100	(1) (1) (1) (1) 1 (1) (1) (1) 1 (1)		1
06-20-84 06-27-84 07-02-84	0	15 11 7	38 44 29	54 67	69 89	85 100	100	8 10 10 10 10 10 10 10 10 10 10 10 10 10		
07-11-84	ŏ	ģ	27	62 45	73 73	91 82	100 100			
07-19-84 07-27-84	0	10 11	25 39	55 72	85 89	100 100		٠	1	
	<u>54.</u>	Jefferson	Creek	near Jei	fe <u>rs</u> on,	Colo.				
05-16-84 05-26-84	4	19	41	63	81	93	100			
06-07-84 06-13-84	0	13 9 18	33 27 45	50 45 64	67 64 82	83 82 100	100 100		•	
06-28-84	0	15	38	54	77	92	100	ě		
07-10-84 % 67-25-84 69-19-84 69-19-84	0 0 0	20 10 17	47 25 33	60 47 50	73 73 67	87 92 83	100 100 100	,		
		N. Jan		-	•		100			
04-16-84	<u>5</u>	6.00		ear Bai						
04-26-84 0 04-30-84 0	14 7 4	42 50 21	85 93 96	85 93 96	99 100 100	100				
05-03-84 0 05-10-84 0	6 . 5	41 32	88 92	88 92	100 100					
05-15-84 0 0.1 05-17-84 0	· 6	34 29	87 77	87 77	100 97	00	. 100			·
05-24-84 0 0.4	5 4 4	25 36	73 84	73 84	97 89 98	99 93 100	100 100			
05-31-84 0 .4	8	38	92	92	99	100				
06-06-84 0 1 06-11-84 0	7 14 8	37 54 33	86 93 92	86 93 92	98 100 100	100				
06-19-84 0 06-26-84 0	10	40 23	90 89	90 89	100 100					
			•							

MEASURED TOTAL SEDIMENT LOADS (SUSPENDED LOADS AND BEDLOADS) FOR 93 UNITED STATES STREAMS



Met Payote bedland samples

Percent by w	veight finer that size	e indicated (mm)
--------------	------------------------	------------------

Sample Date	<0.4	0,8	1.4	4	12 20	
3/5/98	10%	47%	63% 82%		francistics .	>20
3/17/98	10%	47%	83% 82%	90X20.00XXX		100%
3/25/98	6%	28%	38% 54%		200000X XW 2 T T T T T T T T T T T T T T T T T T	100%
4/15/98	ે 3%	23%	37% - 80%			100%
4/25/98	6%	31%	47% 87%		9% 100%	100%
5/8/98	4%	20%	33% 56%		8% 100%	100%
5/28/98	5%	20%	30% 51%		7% 100%	100%
	, S. S. S. S. S. S. S. S. S. S. S. S. S.		1 10 mm in 1 100 mm	86% 9	6% 100%	100%

Attachment 1: Detailed Reply to Comments Received from Tim Hamlin, US-EPA, Region 10 on the Draft Middle Fork Payette Sub-basin Assessment and TMDL

The target loads must be linked to water quality standards along with a demonstration on how these target loads will fully support beneficial uses.

The IDEQ acknowledges that an understanding of the linkages between narrative water quality standards and beneficial use support is required before beneficial use support can be achieved. However, limited or inappropriate data, coupled with time constraints, allowed only partial linkages to be developed for inclusion within the final TMDL. In order to address concerns that the final TMDL submitted to the EPA by the IDEQ provides inadequate linkages, an additional section is included which outlines on going efforts to determine current conditions and improved linkages within the sub-basin.

Additional clarification on the IDEQ's response to this comment can be found in the following attachment (Attachment 2: IDEQ Internal Memo) and in the following excerpts of the final Middle Fork Payette TMDL:

Section 3.1.3

...It is generally recognized that sediment input increases which result in observable changes in stream characteristics are detrimental to fisheries, however, it is extremely difficult to identify the point where these increases begin to affect reach deposition, transport capacity, and changes to particle size distributions (Chapman and McLeod, 1987; Potyondy et al., 1991). Prior to this TMDL, a threshold of 100% above background was selected as "excessive sediment" by the USDA Boise National Forest. This threshold was determined by an observation by Potyondy et al. (1991) that impacted conditions within the Middle Fork Payette River were a result of levels above background of as much as 200%. It was observed that these levels were too high based on the observed channel conditions. It was recommended to reduce these historical levels by 50%, or, in other words, set a threshold for sediment production to 100% above background sediment levels (Potyondy et al., 1991).

This TMDL is faced with a similar quandary as the Forest Service was when establishing a sediment production threshold. While it is apparent that the current levels of hillslope sediment production are "excessive" based on the support status of the lower reaches, the degree of excess sedimentation is difficult to quantify at this time. By selecting an increase in reach deposition of 50% over background as the load capacity it is recognized that improvements to the lower reaches will occur (i.e., the amount of sediment currently entering the impaired reaches would need be reduced by half). However, whether these improvements are great exough to meet beneficial use support, either on their own or through additional measures, is unknown at this time. Ongoing IDEQ beneficial use support status analysis, in combination within on going reconnaissance efforts and implementation plan development as described in Section 4, will identify whether the mitial reductions established here are adequate for beneficial use support

Section 3.2.3.

These. (sediment load allocations)...are based on estimated average annual background sediment input rates entering the Middle Fork Payette River. Current cross-section geometries at selected points have been used to represent average reach conditions. These simplifications combine with the annual variability for flow and sediment input to make it unlikely that the exact deposition rates estimated here would ever be present within the Middle Fork Payette River. While it is apparent that the current levels of hillslope sediment production are "excessive" based on the support status of the lower reaches, the degree of excess sedimentation is difficult to quantify. By selecting an estimated increase in reach deposition of 50% over background it is recognized that the current sediment load will need to be reduced by half and that,

through these reductions, improvements to the lower reaches will occur...

... A complete loading analysis, in conjunction with an implementation plan, lays out a general pollution control strategy and an expected time frame in which water quality standards will be met. For narrative criteria, e.g. sediment and nutrient, the measure of attainment of Idaho's water quality standards is full support of beneficial uses (IDEQb, 1998). Long recovery periods (greater than five years) are expected for implemented TMDLs dealing with non-point sediment sources...

... The Clean Water Act §303(d) specifies that, for those waters identified as water quality limited, a TMDL must be established "at a level necessary to implement the applicable water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning that relationship between...these...limitations and water quality" (emphasis added). This TMDL meets these requirements by establishing sediment targets within the Middle Fork Payette Sub-basin Assessment and TMDL in terms of a "percent above background" based on the bankfull discharge from the Middle Fork Payette River resolved into an estimated annual background and current annual sediment load. This means that the allocations established by this TMDL are in terms of a percent above background of the annual sediment load. Flexibility to quantify the load capacity and allocations in annual verses daily sediment loads is provided in 40 CFR Part 130.2(i). Note that the Middle Fork Payette River is an unregulated system, flows occur according to seasonal patterns and annual variations. Therefore, the annual allocations established reflect the Middle Fork Payette seasonal patterns and annual variations. The IDEQ asserts that if these sediment targets are attained the support of the beneficial uses will improve Additionally, the IDEQ expects these sediment targets to be adjusted over time as progress towards beneficial use support is made and efforts to improved current sediment load estimations continue. Specific on going efforts to improve current sediment loads within the sub-basin are described more fully in Section 4.

Section 4.3

.. As the draft IDEQ guidance for TMDL development states: "a phased approach is often appropriate when nonpoint sources are a large part of the pollutant load, information is limited, or narrative criteria are being interpreted" (IDEQb, 1998). Each of these considerations apply to the Middle Fork Payette TMDL. Under these circumstances there is a great deal of uncertainty in the loading analysis, load capacity and its allocation.

The draft IDEO guidance for TMDL development suggests in these cases that: "this uncertainty calls for a "ramping up" of implementation in which the more obvious sources of load reduction are scheduled for action first, with increasingly difficult and less cost effective load reductions scheduled further out in time. Essential to this strategy is gathering of information which will allow refinement of the loading analysis and document when restoration of beneficial uses occurs. The implementation schedule may be revised if additional data indicate an upward revision in the loading capacity fless load reduction required to meet beneficial uses then at first estimated), better than anticipated load reductions, or that water quality standards are met prior to full implementation" (IDEOb. 1998).

2. Establish measurable targets so that responsible agencies and/or landowners will be able to decide where, how and by how much to reduce sediment

The final TMDL establishes billslope (i.e., land manager/owner) targets for the contributing areas of each impaired reach. These are presented in terms of a "percent above background" and "tons/year" based on background sediment production rates as estimated by BoiSed. In order to address concerns that the final TMDL submitted to the EPA by the IDEQ provides inadequate benchmarks for target attainment, an additional section is included which outlines an implementation plan development strategy. The Watershed Advisory Group, along with designated responsible management agencies, is the designated entity required to

develop the Implementation Plan and to ensure target attainment (i.e., beneficial use support).

Additional clarification on the IDEQ's response to this comment can be found in the following excerpts from the final Middle Fork Payette TMDL:

Section 3.2.3.

...As already stated, TMDLs are defined in 40 CFR Part 130 as the sum of the individual Waste Load Allocation (WLA) for point sources and Load Allocation (LA) for nonpoint sources, including a margin of safety (MOS) and natural background conditions. And, the Middle Fork Payette TMDL addresses pollutant loading from nonpoint sources only. Allocations are presented for each of the impaired reaches of the Middle Fork Payette River. These allocations specify load capacities, target nonpoint management load allocations, and a margin of safety based on the estimated background loads for each of the contributing areas to the impacted reaches. The load allocation in terms of "percent above background" identified for each subwatershed are estimated based on the portion of the total load that can be contributed by management activities...

...Table 12 summarizes the results of these transport capacity estimates for each reach analyzed. Reaches 5, 6, and 7 (see bold) are the impaired reaches. Load capacities and allocations are established for the contributing areas to these three reaches. The contributing area for Reach 5 includes the entire sub-basin area upslope and upstream of a point just downstream of the confluence between Lightning Creek and Middle Fork Payette River. The contributing area for Reach 6 includes the entire sub-basin area upslope and upstream of a point just upstream of the confluence between Anderson Creek and the Middle Fork Payette River. The contributing area for Reach 7 is the entire Middle Fork Payette sub-basin drainage...

...Current load estimates, also in terms of "percent above background", as estimated by the SedMod sediment production model (Glass, 1998) are presented in Table 14 to show preliminary sediment reductions required for the impaired reaches. Each of the required sediment reductions apply to the entire contributing areas of each of the impaired reaches...

...Land use and related activities within the Middle Fork consist of related timber harvest activities and recreations in all of the sub-watersheds except Pyle. Therefore, the allocations established for Reach 5 are for those activities related to timber harvesting and recreation. Allocations established for Reaches 6 and 7 which receives contributions from the Pyle sub-watershed, however, apply to agricultural, grazing, and urban nonpoint source activities in addition to timber harvest and recreation related nonpoint source activities. Table 15 shows the breakdown in acreage and in the proportional contributions of each of the identified activities within the Pyle sub-watershed that contribute to the nonpoint sediment load according to a proportioning analysis conducted using the Watershed Erosion Prediction Project (WEPP) model (Agricultural Research Service, 1997; Elliot et al., 1997; Flanagan and Livingston, 1995, IDEQa, 1998).

3. If there are areas where increasing the sediment load to the target percent above background would degrade existing quality, the State of Idaho Antidegredation Policy would need to be met.

Changes have been made in the final TMDL document to specify that land use activities within the Middle Fork Payette Sub-basin will continue to be conducted so that they comply with the State of Idaho Antidegredation Policy as stated in IDAPA 16.01.02.051.

Please note that reductions in sediment loads are required for each of the impaired reaches of the Middle Fork Payette River. Therefore, an increase in sediment load to the target percent above

background is not supported by the current TMDL loading analysis and allocations. Additional clarification on the IDEQ's response to this comment can be found in the following excerpts from the final Middle Fork Payette TMDL:

Section 3.2.3.

...Current load estimates, also in terms of "percent above background", as estimated by the SedMod sediment production model (Glass, 1998) are presented in Table 14 to show preliminary sediment reductions required for the impaired reaches. Each of the required sediment reductions apply to the entire contributing areas of each of the impaired reaches.

Table 14: Current Cumulative Sediment Loads, Cumulative Management Allocations, and Required Sediment Load Reductions*

	Cumulati	ve . C	umulative	Req	uired ***	
	Current L	10 m 10 m 10 m 10 m 10 m 10 m 10 m 10 m	fanagement	一点 シェスティア 佐藤	inet	
Re	Estimate ach above bk		llocation (% pove bkgmd)		d Reduction above blegrad)	
R1 R2	35		5	0		
R3 R4	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	3 3	3 3	29 31		
R5	54	3	1	20		
R6 R7		3. 3.	2 }}***************	35 33		

^{*}Current load estimate for percent above background based on SedMod (Boise Cascade, 1998).

The TMDL lacks an identifiable load allocation.

TMDLs are defined in 40 CFR Part 130 as the sum of the individual Waste Load Allocation (WLA) for point sources and Load Allocation (LA) for nonpoint sources, including a margin of safety (MOS) and natural background conditions. The final TMDL submitted to the EPA by the IDEQ established Load Allocations (i.e., for nonpoint sources), a margin of safety, and natural background conditions for each of the impaired reaches in terms of a "percent above background" and tons/year based on background sediment production rates as estimated by BoiSed.

Please note that guidance for establishing load allocations for nonpoint pollutant sources by the EPA allows for "gross allocations" (US-EPA, 1991). The IDEQ would appreciate being notified if this guidance has been significantly changed by the US-EPA. Additional clarification on the IDEQ's response to this comment can be found in the following excerpts from the final Middle Fork Payette TMDL:

Section 3.2.3., page 43

...Allocations are presented for each of the impaired reaches of the Middle Fork Payette River. These allocations specify load capacities, target nonpoint management load allocations, and a margin of safety based on the estimated background loads for each of the contributing areas to the impacted reaches. The load allocation in terms of "percent above background" identified for each sub-watershed are estimated based on the portion of the total load that can be contributed by management activities.

Where uncertainty exists (and this is almost always the case) about the amount of pollutant a water body can reasonably assimilate, federal law requires a margin of safety (MOS) be included in the calculations. The MOS may be numerical or be incorporated in conservative assumptions used to establish the TMDL. The MOS is intended to ensure that water quality goals will be met even though uncertainty in the loading capacity exists.

Table 12 summarizes the results of these transport capacity estimates for each reach analyzed. Reaches 5, 6, and 7 (see bold) are the impaired reaches. Load capacities and allocations are established for the contributing areas to these three reaches. The contributing area for Reach 5 includes the entire sub-basin area upslope and upstream of a point just downstream of the confluence between Lightning Creek and Middle Fork Payette River. The contributing area for Reach 6 includes the entire sub-basin area upslope and upstream of a point just upstream of the confluence between Anderson Creek and the Middle Fork Payette River. The contributing area for Reach 7 is the entire Middle Fork Payette sub-basin drainage...

1997, to make status calls using the Water Body Assessment Guidance.
The IDEQ evaluated the support status for all beneficial uses within the Middle Fork Payette Sub-basin by using the most complete data available at the time of document development. All water body assessments were made using available data received as a result of requests submitted to multiple agencies (e.g. USDA Boise National Forest, Boise Cascade Corp. IFO, IDWR, BOR, and USOS) on July 11, 1997 and are available in the IDEQ document support files. One bacteria samples was taken on September 11, 1997 that showed 560/100 ml colonies of fecal coliform. This level exceeds the primary contact recreation criteria exceedence is unknown, and the sample collected was found to be within 12% of the criteria, it was determined that this exceedence was minor and therefore does not downgrade the beneficial use.

For additional clarification, see Attachment 3 (Attachment 3: IDEQ Internal Memo) below.

6. The IDEQ must assess use support prior to removal from the 303(d) list, e.g., salmonid spawning in Scriver and Anderson Creeks.

The reason for the "Not Assessed" support status call for salmonid spawning on Scriver and Anderson Creeks is available in the IDEQ document support files. These two water bodies have a revised assessment of "Full Support" in the final TMDL document.

Please note that the "Not Assessed" support status call submitted in the Draft document was as a result of inadequate time for support status data review. This support status call was revised in the final document after further analysis by IDEQ staff. For additional clarification, see Attachment 3 (Attachment 3: IDEQ Internal Memo) below.

 Present data to backup the full support of salmonid spawning status call in the lower Middle Fork Payette River.

These data are not available for those sections of the Middle Fork Payette River, and thus forces the IDEQ to make this assessment based on best professional judgement. The Data Gaps section within the final TMDL discusses these issues in more detail.

Additional clarification on the IDEQ's response to this comment can be found in the following excerpts from the final Middle Fork Payette TMDL:

Section 3.1.1.

... Most of the fishery information collected in this watershed are from the upland tributaries. Since the lower section of the Middle Fork of the Payette has relatively low numbers of fish, is not administered by Boise National Forest (who does most of the inventories in this area), and is dominated by non-game fish, it has not been intensively monitored. An inventory of juvenile species composition within the lower reach stream margins is also lacking at this time.

Obtaining this additional information on fish presence and usage would allow an improved diagnosis for the specific needs of designated and existing species within the lower reaches. This information is also needed to determine both the current baseline for cold water biota support and to provide a measure of beneficial use recovery. Because of these diagnostic and ongoing needs to determine cold water biota support status, it is evident that a fish inventory for both game and non-game fish in the lower Middle Fork Payette river is a data gap.

8. Please explain or clarify how the TMDL accounts for seasonal variation and critical

conditions.

The Clean Water Act Section 303(d) specifies that, for those waters identified as water quality limited, a TMDL must be established "at a level necessary to implement the applicable water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning that relationship between. these, limitations and water quality" (emphasis added). The final TMDL proposed by the IDEQ meets these requirements by establishing sediment targets in terms of a "percent above" background" based on the bankfull discharge from the Middle Fork Payette River resolved into an estimated annual background and current annual sediment load. This means that the allocations established by this TMDL are in terms of a percent above background of the annual sediment load. Flexibility to quantify the load capacity and allocations in annual verses daily sediment loads is provided in 40 CFR Part 130.2(7). Note that the Middle Fork Payette River is an unregulated system, flows occur according to seasonal patterns and annual variations. Therefore, the annual allocations established reflect the Middle Fork Payette seasonal natterns and annual variations

to the control of the winds of the walk of Include the basis for stream listings on the 303(d)list early in the sub-basin assessment. Changes have been made in the final TMDL document to address this comment.

Additional clarification on the IDEQ's response to this comment can be found in the following excerpts from the final Middle Fork Payette TMDL: Section 1

... In 1994 the EPA placed five tributaries and the mainstern of the Middle Fork Payette River on Idaho's 303(d) list as water quality limited due to excess sediment. These segments were carried forward to the 1996 list. The listed segments included: Anderson Creek, Lightning Creek, Scriver Creek, Bulldog Creek, Silver Creek, and the mainstem of the Middle Fork Payette River. All of the listed segments were located within the Boise National Forest and were determined to be water quality limited based on exceedences of the Boise National Forest Plan standards and guidelines (USDA, 1990) and best professional judgement. Guidance for listing water bodies as water quality limited provided by Region 10 of the EPA states that any determination of water quality limited status based on this type of exceedences and professional judgement can be reexamined (EPA, 1995)...

10. What was the basis for subwatershed ranking? How do these rankings fit into the sediment source assessment?

Changes have been made in the final TMDL document to address this comment.

Specifically, the subwatershed ranking was conducted at an inappropriate scale for the current analysis and was dropped from the final TMDL document.

11. Include a table which identifies both hill slope delivery and surface erosion delivery rates. Changes have been made in the final TMDL document to address this comment.

Specifically, please refer to Table I in Appendix B, on page B3.

12. Where is streambank erosion active and what percentage of the sediment load is from bank erosion?

Changes have been made in the final TMDL document to address this comment

Additional clarification on the IDEQ's response to this comment can be found in the following section included in the final Middle Fork Payette TMDL:

Section 2,3.1.1

...Field observations by IDEQ personnel have noted active streambank erosion in few isolated places within Reach 5 of the Middle Fork Payette River. The locations and amount of streambank erosion suggest that this erosion is a result of a high sediment load from the contributing area to Reach 5 and subsequent channel morphology change. The rate of erosion is a function of channel morphology change only. Therefore, it is thought that the percentage of the current sediment load due to bank erosion is not significant when compared to the sediment load from the contributing area to Reach 5.

13. Clarify monitoring by landowners, what and how do they interpret data? Changes have been made in the final TMDL document to address this comment.

Additional clarification on the IDEQ's response to this comment can be found in the following excerpts from the final Middle Fork Payette TMDL:

Section 3,2.3

...Current load estimates, also in terms of "percent above background", as estimated by the SediMod sediment production model (Glass, 1998) are presented in Table 14 to show preliminary sediment reductions required for the impaired reaches. Each of the required sediment reductions apply to the entire contributing areas of each of the impaired reaches, for all times of the year, for all forms of sediment inputs to the Middle Fork Payette River.

Table 14: Current Cumulative Sediment Loads, Cumulative Management Allocations, and Required Sediment Load Reductions*

	200	umulative	Cumulative	Required
;	, C	urrent Load	Management	Sodiment 32 3
Read	4	stimate (% bove bkgmd)	Allocation (% above bkgrnd)	Load Reduction (% above bkgrnd)
R1 R2	3 7 7 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	5. 9	35 34	
R3 R4	6		33 33	29
R5 R6	54 6	1	34 32	20
<u>R7</u>	6:		32	33

^{*}Current load estimate for percent above background based on SedMod (Boise Cascade, 1998).

Land use and related activities within the Middle Fork consist of related timber harvest activities and recreations in all of the sub-watersheds except Pyle. Therefore, the allocations established for Reach 5 are for those activities related to timber harvesting and recreation. Allocations established for Reaches 6 and 7, which receives contributions from the Pyle sub-watershed, however, apply to agricultural, grazing, and urban nonpoint source activities in addition to timber harvest and recreation related nonpoint source activities. Table 15 shows the breakdown in acreage and in the proportional contributions of each of the identified activities within the Pyle sub-watershed that contribute to the nonpoint sediment load according to a proportioning analysis conducted using the Watershed Erosion Prediction Project (WEPP) model (Agricultural Research Service, 1997; Elliot et al. 1997; Flanagan and Livingston, 1995; IDEQa, 1998).

Table 15: Nonpoint Source Activity, Acres, and Proportion of load from the Pyle Sub-Watershed

Activity		Acres	Proportion of Sediment L	1 1 22 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Roads		471	97,4%	
Pasture		5000	2.0%	The same of the same of the
Hay: 0-5	% Slopes	1500	0.0%	
Hay: 6-2	0% Slopes	500	0.4%	
Urban		640	0.1%	* 3.79
	struction: 0-5% Slope		0.1%	
New Con	struction: 6-20% Slop	xes 6	0.1%	
Forest		11418	0.0%	
Total		19560		Service of the servic

Note that the roads listed in this table are owned by a variety of agencies and are used for timber harvest, recreation, residence access, and agriculture and pasture access. Also note that the allocations specified for Reaches 6 and 7 include the entire contributing areas for each of these reaches, of which the Pyle subwatershed composes a small portion. Refinement of these allocations will be required during the development of specific actions for sediment reductions during the implementation phase of this TMDL.

A complete loading analysis, in conjunction with an implementation plan, lays out a general pollution control strategy and an expected time frame in which water quality standards will be met. For narrative criteria, e.g.

sediment and nutrient, the measure of attainment of Idaho's water quality standards is full support of beneficial uses (IDEQb, 1998). Long recovery periods (greater than five years) are expected for implemented TMDLs dealing with non-point sediment sources. Because of the expected long term recovery periods, the Middle Fork Payette River TMDL allows for short term increases in sediment production as a result of restoration and timber management activities that will reduce overall sediment production in the long term. Water quality targets in these cases may be recommended by the IDEQ to ensure overall TMDL compliance...

Section 4.

...The draft IDEQ TMDL development guidance also suggests that monitoring to ascertain achievement of water quality goals is an essential part of implementation plans. Instream monitoring and assessment of water quality is to be done by IDEQ. Implementation monitoring will be done by designated state agencies as defined in IDAPA 16.01.02.003.23 (IDEQb, 1998).

Section 4.1

...Upon approval of this TMDL by EPA Region 10, a Middle Fork Payette River TMDL Implementation Plan will be developed by designated supporting agencies and stakeholders. The Idaho Water Quality Standards directs appointed basin and watershed advisory groups to provide public review on recommended actions to achieve the water quality target listed in the Middle Fork Payette River TMDL.

The Middle Fork Payette River TMDL implementation Plan will aim to be the most appropriate plan for nonpoint sediment source pollution controls. The Plan will list activities which are to be implemented by land managers within the community to enhance the water quality of the Middle Fork Payette River. The Plan will include specific actions to meet the TMDL targets and a schedule for implementation of each activity. These activities might include, but are not limited to: forest road reconstruction, road closures, ongoing road maintenance programs, slide stabilization projects, riparian tree plantings, agricultural best management practices, bioengineering structures, wetland restoration, urban storm water system upgrades, development of a tax relief policy for riparian areas, development of an erosion control ordinance and education and information programs to increase community awareness of the river's water quality conditions and the activities to be undertaken to restore the river's water quality.

Section 4.2

...Idaho's short TMDL development schedule and the regulatory allowances point to phased or iterative TMDLs. In a phased TMDL much is yet unknown and the initial loading analysis may be inexact. The initial phase focuses on what is known. Progressive load reduction moves toward the eventual goal by targeting more obvious source problems in the implementation plan. Essential to this approach is inclusion, in the implementation plan, of a plan to gather the data needed to refine load estimates and their allocation. On going efforts to assess sediment loads within the Middle Fork Payette basin are presented here, with the caveat that these and other efforts will be better refined as the implementation plan is developed.

The IDEQ welcomes the assistance of other agencies, or private organizations, with the resources and interest in TMDL implementation plan development and on going efforts to assess current pollutant loads. Additionally, the IDEQ recognizes that many others hold information and expertise and encourage these agencies to work with the appointed Middle Fork Payette Watershed Advisory Group and stakeholders during TMDL development and implementation (IDEQb, 1998).

On going studies relevant to the Middle Fork Payette River Sub-basin in general, but not necessarily to the establishment of this TMDL, include: 1) baseline monitoring sites (USDA Forest Service, Boise National Forest); 2) Idaho Department of Water Resources Basin Plan; a. d 3) IDEQ Bull Trout Problem Assessment. Additional on going studies relevant to the Middle Fork Payette River Sub-basin specific to sediment load

descriptions and analysis include: 1) a land slide inventory (Boise Cascade Corporation); 2) SedMod model application refinements and general model refinements; 3) Idaho Department of Lands Cumulative Effects Watershed Procedure; and 4) Middle Fork Payette River Sediment Trend Monitoring (EPA, IDEQ, and USDA Forest Service, Boise National Forest).

(Note: Additional ongoing studies are described in greater detail in Sections 4.2.1, 4.2.2, 4.2.3, and 4.2.4.)

14. The TMDL should establish a framework which specifically outlines the elements that need to be evaluated by land managers. These might include: surface and fluvial erosion and mass failure risk from proposed and existing impacts.

Changes have been made in the final TMDL document to address this comment.

Additional clarification on the IDEQ's response to this comment can be found in the following excerpts from the final Middle Fork Payette TMDL:

Section 4.1

Upon approval of this TMDL by EPA Region 10, a Middle Fork Payette River TMDL Implementation Plan will be developed by designated supporting agencies and stakeholders. The Idaho Water Quality Standards directs appointed basin and watershed advisory groups to provide public review on recommended actions to achieve the water quality target listed in the Middle Fork Payette River TMDL.

The Middle Fork Payette River TMDL Implementation Plan will aim to be the most appropriate plan for nonpoint sediment source pollution controls. The Plan will list activities which are to be implemented by land managers within the community to enhance the water quality of the Middle Fork Payette River. The Plan will include specific actions to meet the TMDL targets and a schedule for implementation of each activity. These activities might include, but are not limited to: forest road reconstruction, road closures, ongoing road maintenance programs, slide stabilization projects, riparian tree plantings, agricultural best management practices, bioengineering structures, wetland restoration, urban storm water system upgrades, development of a tax relief policy for riparian areas, development of an erosion control ordinance and education and information programs to increase community awareness of the river's water quality conditions and the activities to be undertaken to restore the river's water quality...

Section 4.2.1. (Landslide Inventory)

The need for an adequate prediction and planning tool to assess background and management induced rates of mass wasting was identified as a serious data gap during the development of this TMDL. However, the lack of appropriate historical data, combined with a lack of an adequate sub-basin recommissance for current land slide features, prevented the development of this prior to submittal of this TMDL.

In order to address this data gap, the Boise Cascade Corporation has begun to develop a GIS based land slide inventory data set on current and historical land slide events within the region (Glass, 1998). This effort is being conducted in cooperation with the USDA Forest Service, IDEQ, and others. Because the sediment reduction targets established by this TMDL include a mass wasting component, it is important for this effort to continue in a cooperative manner with all effected responsible land management agencies so that they may justify and defend their management actions within the Middle Fork Payette sub-basin.

Sectin 4.2.2. (Boise Cascade SedMod Model Improvements)

Improvements are in the process of being made to Boise Cascade's SedMod sediment prediction model.

These improvements include a quality control check for stream initiation locations within the Middle Fork

Payette River sub-basin in addition to modifications to the SedMod model itself (Glass, 1998).

Section 4.2.3. (Idaho Department of Land's Cumulative Watershed Effects Procedure) & A Cumulative Watershed Effects (CWE) inventory is expected to be completed by the Idaho Department of Lands during the summer of 1999. Field data collection and recontains after was funshed during the fall of 1998, review and data reduction is planning to be completed during the winter of 1999, with the final report to be available summer of 1999.

The CWE process was developed in order to meet antidegradation provision specified by the Clean Water Act. The concept of cumulative effects suggest that, while impacts from any single forest practice may not exceed Idaho water quality standards if BMPs are properly applied, impacts from a series of practices may add up to Idaho water quality standard exceedences. The CWE process is designed to first examine conditions in a watershed surrounding a stream, then attempts to identify causes of the conditions, and finally, to identify actions that will correct any identified adverse conditions. It is the identification of actions to correct identified adverse conditions that should prove especially useful to the Middle Fork Watershed Advisory Group during TMDL implementation plan development.

Section 4.2.4. (Middle Fork Payette River Sediment Trend Monitoring)

The purpose of the Middle Fork Payette River Sediment Trend Monitoring is to collect information on the surface water sediment conditions within the Middle Fork Sub-basin to: 1) isolate the form of sediment impairing beneficial uses (i.e., turbidity vs bedload impacts); 2) characterize existing sediment load trends; and 3) validate predictive sediment equations. This is a cooperative monitoring effort funded by the EPA and involving personnel from the EPA, IDEQ, and the USDA Forest Service. So far the data collected has provided: 1) stage: discharge relationships at two sites along the Middle Fork Payette River; 2) a general partitioning between suspended and bedload within the lower reaches of the Middle Fork Payette River; 3) the average particle size for captured bedload at two sites along the Middle Fork Payette River; 4) a general comparison between the bedload grain size captured and the substrate grain size at two sites along the Middle Fork Payette River; 5) estimated bedload vs discharge curves for two sites based on 11 bedload samples; and 6) estimated bedload vs discharge curves for 9 tributaries to the Middle Fork Payette River based on one bankfull discharge bedload measurement (Fitzgerald et al. 1998b).

15. The TMDL should estimate the existing and potential sources of sediment in the watershed to conceptualize the present condition of the river and establish the load reduction needed.

The IDEQ acknowledges that an understanding of the linkages between sediment sources and the present condition of the Middle Fork Payette River is required to identify specific actions for TMDL target attainment. In order to address concerns that the final TMDL submitted to the EPA by the IDEQ provides inadequate linkages, an additional section is included which outlines on going efforts to determine current conditions and an improved understanding of the linkages within the sub-basin.

Additional clarification on the IDEQ's response to this comment has been included in the document excerpt under Comment 14.

16. The TMDL needs to list all limitations and assumptions used in the loading analysis. Changes have been made in the final TMDL document to address this comment.

Additional clarification on the IDEQ's response to this comment can be found in the following excerpts from the final Middle Fork Payette TMDL:

Section 4.2.2. (Model Application and Assumptions)

The Parker bedload equation is used in the Middle Fork Payette River TMDL loading analysis to develop an allowable rate of deposition above background. This model is an empirical model developed on streams with gravel substrates. Validation studies of the Parker model have been conducted in the Sierra batholith streams (Andrews and Nankervis, 1995). Because the Middle Fork Payette River is dominated by gravel size substrate in the lower reaches (i.e., D50 = 5 mm diameter) the Parker equation was determined to be appropriate. Assumptions used in the current application are as follows:

- Steady and uniform flow conditions at bankfull stage represents the two year (i.e., channel forming)
- Channel roughness, slope, and geometry are uniform along each of the designated reaches.
- The sediment particle size distribution entering the tributaries and the Middle Fork Pavette River is uniform throughout the sub-basin.

The TMDL needs to fully explain the modeling analysis and assumptions and qualify and quantify the effects theses assumptions have on the certainty of output. Changes have been made in the final TMDL document to address this comment.

Additional clarification on the IDEO's response to this comment can be found in Attachment 4 and in the following excerpts from the final Middle Fork Payette TMDL:

Appendix B. Section 4.2.1

An analysis of reach transport capacity was conducted using current reach geometry characteristics and background sediment levels. These background sediment levels were then increased until the rate of deposition within each reach was 50% above background deposition rates. Sediment transport for bedload used Parker's equation for uniform mobility for each particle size class (Parker, 1990; Kinerson, 1986; Wilcock et al. 1996. Andrews and Nankervis. 1995)

Table 1 presents the amount of background hillshope crosion estimated to enter the Middle Fork Payette River (see Amount Delivered, Table 1). These average annual sediment inputs were partitioned into particle size classes based on the Soil Survey of the Middle Fork Payette River Basin (USDA, 1976).

Beginning in the appearment reach (Reach 1), background sestiment input was totaled for each of the contributing sub-watersheds and routed through the reach. Those sediments that were shown to be output at the bottom of the first reach were then couled to the second reach as primary input. Tributary background sediment input from the contributing sub-watershed were then added to the primary input within the second reach and routed to the third reach. This pattern (i.e., adding the sediment routed down from upper reaches to the tributary inputs from the nearby sub-watersheds, then routing the total down to the next reach) was continued down until the confluence with the South Fork Payette River. Sediment input from the subwatersheds was then increased until the deposition rate within each reach was 50% above the deposition rate during background input levels

Certain inputs and results of the sediment transport capacity model were checked for each reach in order to determine how well the inputs and model fit within the Middle Fork Payette River system. These included a check on the channel geometry during the two-year flow, and a check on the observed verses the predicted medium particle size (i.e., D50) for the reach. The results of these checks are presented in Table 3.

Table 3: Parker Transport Capacity Model Input and Reach Medium Size Particle Check

Flow	(cfs) * FI	wo-Yr ow (cfs)	Difference :	Particle Size	(mm) Particl	e Size (mm)
R1 13.2 R2 16.2 R3 36.7 R4 42.9	11 12	redicted)**	n Flow (%) 13 25 17	(Observed) 68 68 97	(Bkgrd) 97 54 93	(Target) 75 52 90
R5 58.6 R6 79.2 R7 89.4	58 93 79	.8	0 19	38 5 5	41 18 16	40 17

^{*}Based on Fitzgerald, 1998b

18. Please explain why the Parker model was used for a sand bed streams. Changes have been made in the final TMDL document to address this comment.

Additional clarification on the IDEQ's response to this comment can be found in Attachment 4 and in the following excerpts from the final Middle Fork Payette TMDL:

Appendix B. Section 4.2.2.

The Parker bedload equation is used in the Middle Fork Payette River TMDL loading analysis to develop an allowable rate of deposition above background. This model is an empirical model developed on streams with gravel substrates. Validation studies of the Parker model have been conducted in the Sierra batholith streams (Andrews and Nankervis, 1995). Because the Middle Fork Payette River is dominated by gravel size substrate in the lower reaches (i.e., D50 = 5 mm diameter) the Parker equation was determined to be appropriate... (emphasis added)

Please explain why a 10% margin of safety is adequate.
 Changes have been made in the final TMDL document to address this comment.

Additional clarification on the IDEQ's response to this comment can be found in the following excerpts from the final Middle Fork Payette TMDL:

Section 3.2.3.

...Allocations are presented for each of the impaired reaches of the Middle Fork Payette River. These allocations specify load capacities, target nonpoint management load allocations, and a margin of safety based on the estimated background loads for each of the contributing areas to the impacted reaches. The load allocation in terms of "percent above background" identified for each sub-watershed are estimated based on the portion of the total load that can be contributed by management activities.

Where uncertainty exists (and this is almost always the case) about the amount of pollutant a water body can reasonably assimilate, federal law requires a margin of safety (MOS) he included in the calculations. The MOS may be numerical or be incorporated in conservative assumptions used to establish the TMDL. The MOS is intended to ensure that water quality goals will be met even though uncertainty in the loading

^{**}Based on the Manning's Equation for the Q2 channel cross-section (Richards, 1982; IDEQa, 1998).

capacity exists...

...The Clean Water Act §303(d) specifies that, for those waters identified as water quality limited, a TMDL must be established "at a level necessary to implement the applicable water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning that relationship between these limitations and water quality" (emphasis added). This TMDL meets these requirements by establishing sediment targets within the Middle Fork Payette Sub-basin Assessment and TMDL in terms of a "percent above background" based on the bankfull discharge from the Middle Fork Payette River resolved into an estimated annual background and current annual sediment load. This means that the allocations established by this TMDL are in terms of a percent above background of the annual sediment load. Flexibility to quantify the load capacity and allocations in annual verses daily sediment loads is provided in 40 CFR Part 130.2(i)...The IDEQ asserts that if these sediment targets are attained the support of the beneficial uses will improve. Additionally, the IDEQ expects these sediment targets to be adjusted over time as progress towards beneficial use support is made and efforts to improve current sediment loads within the sub-basin are described more fully in Section 4.

...It should be noted that the transport capacity model uses physical parameters and inputs that are not based on conservative assumptions, however, the load capacity specified includes not only surface crosson, but mass wasting contributions as well. Therefore, in addition to the margin of safety that has been applied, the allocations are considered conservative due to the use of background estimates that include mass wasting. (emphasis added).

Section 4.2.

Idaho's short TMDL development schedule and the regulatory allowances point to phased or iterative TMDLs. In a phased TMDL much is yet unknown and the initial loading analysis may be inexact. The initial phase focuses on what is known. Progressive load reduction moves toward the eventual goal by targeting more obvious source problems in the implementation plan. Essential to this approach is inclusion, in the implementation plan, of a plan to gather the data needed to refine load estimates and their allocation. On going efforts to assess sediment loads within the Middle Fork Payette basin are presented here, with the caveat that these and other efforts will be better refined as the implementation plan is developed.

The IDEQ welcomes the assistance of other agencies, or private organizations, with the resources and interest in TMDL implementation plan development and on going efforts to assess current pollutant loads. Additionally, the IDEQ recognizes that many others hold information and expertise and encourage these agencies to work with the appointed Middle Fork Payette Watershed Advisory Group and stakeholders during TMDL development and implementation (IDEQb, 1998)...

20. Update surface erosion estimates from SedMod to represent current conditions. In order to address concerns that the final TMDL submitted to the EPA by the IDEQ provides an inadequate current condition assessment, an additional section is included which outlines on going efforts to determine current conditions within the Middle Fork Payette River sub-basin.

Additional clarification on the IDEQ's response to this comment can be found in the following excerpts from the final Middle Fork Payette TMDL:

Section 4.2.2. (Boise Cascade SedMod Model Improvements)
Improvements are in the process of being made to Boise Cascade s SedMod sediment prediction model.
These improvements include a quality control check for stream initiation locations within the Middle Fork

Payette River sub-basin in addition to modifications to the SedMod model itself (Glass, 1998).

March 3, 1999

MEMORANDUM

TO:

Larry Koenig

Assistant Administrator

FROM:

Steve West

Regional Administrator

SUBJECT:

Middle Fork Payette River (justification for 50% above background)

As requested, we are providing the information regarding the 50% above background target which can be found on page 40 of the document. As you may recall, our original document contained a target for pool frequency per river mile. A decision was made to not include this target because of the link to habitat impairment which is not considered a pollutant by DEQ.

3.1.3. Sediment Transport Capacity

This TMDL establishes a target for sediment input in terms of "percent above background" based on a 50% increase in reach deposition rates over background deposition rates. These results are based on average annual background sediment input rates entering the Middle Fork Payette River. Current cross-section geometries at selected points have been used to represent average reach conditions. These simplifications combined with the annual variability for flow and sediment input to make it unlikely that the exact deposition rates estimated here would be present within the Middle Fork Payette River. New data, information, or model refinements to this approach will most likely lead to improvements in future applications.

It is generally recognized that increases in sediment input which result in observable changes in stream characteristics are detrimental to fisheries. However, it is extremely difficult to identify the point where these increases begin to affect reach deposition, transport capacity, and changes to particle size distributions (Chapman and McLeod, 1987; Potyondy et al, 1991). Prior to this TMDL, a threshold of 100% above background was selected as "excessive sediment" by the USDA Boise National Forest. This threshold was determined by an observation by Potyondy et al. (1991) that impacted conditions within the Middle Fork Payette River were a result of levels above background of as much as 200%. It was observed that these levels were "excessive" based on the observed channel conditions. It was recommended to reduce these historical levels by 50%, or, in other words, set a threshold for sediment production to 100% above background sediment levels (Potyondy et al, 1991).

: 23

Larry Koenig March 3, 1999 Page 2

This TMDL is faced with a similar quandary when establishing a sediment production threshold. While it is apparent that the current levels of hillslope sediment production are "excessive" based on the support status of the lower reaches, the degree of excess sedimentation is difficult to quantify at this time. By selecting an increase in reach deposition of 50% over background as the load capacity it is recognized that improvements to the lower reaches will occur (i.e., the amount of sediment currently entering the impaired reaches would need to be reduced by half). However, whether these improvements are great enough to meet beneficial use support, either on their own or through additional measures, is unknown at this time. Ongoing IDEQ beneficial use support status analysis, in combination with on going reconnaissance efforts and implementation plan development as described in Section 4, will identify whether the initial reductions established here are adequate for beneficial use support.

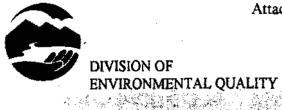
Emphasis has been added to highlight the fact that the reduction specified is based on an estimate of the reductions necessary. It is our opinion that the 50% above background target is conservative, based on the observations made by the forest service, and comments received from the Boise Cascade Corporation agree with this position. Emphasis has been added to the last sentence from the document because this represents the "feedback loop" where additional information will become available to refine the original estimates. "Adaptive management" of the watershed is needed where additional restoration may be appropriate should the target not be sufficient to meet beneficial uses.

In summary, we believe the approach taken in the document is consistent with "40 CFR 130.2(g) Lond Allocation (LA). Load allocations are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading."

If we can provide any other information, please let us know.

cc: Bill Gale
Craig Shepard
Bob Steed
Mike McIntyre
Johanna Luce

Attachment 3: IDEQ Internal Memo



1445 North Orchard, Boise, ID 83706-1255,(208) 373-0502

Philip E. Batt, Governor

. 2

MEMORANDUM

to:

Johanna Luce

from:

Robert Steed

subject:

Middle Fork Payette Assessment Calls.

date:

April 21, 1999

After receiving comments on the Middle Fork Payette River TMDL regarding assessment of Salmonid Spawning on Anderson Creek and Scriver Creek, and the bacteria data on Anderson Creek, I have decided to continue assessment, past original state. This memo contains the justification for my actions.

The reason for the original "Not Assessed" salmonid spawning assessments

Anderson Creek has had limited fishery monitoring. There are basically four programs going on that would include fish monitoring for this water body. The first program is the Forest Service's aquatic survey and aquatic survey data base. A good portion of Anderson Creek is on non-Forest Service land and was not included in this survey. The second program is a past program by Forest Service called the Baseline Inventory. The Baseline Inventory is predominantly dominated by habitat measures and lacks actual measurement of fish. The narrative conclusion from the only site on Anderson Creek states that Anderson Creek is "Very poor fish habitat". It is important to remember that this assessment was done in 1986, after recent fires in this watershed, also "Very poor fish habitat" is a subjective call based on a single site with out actual fisheries information to determine actual fish use. The third program is monitoring performed by Idaho Fish and Game, independent studies. No fish and game studies had been performed in this watershed. The final, fourth, program is Idaho Division of Environmental Quality's Beneficial Use Reconnaissance Project. Anderson Creek was monitoring through this program once in 1993, twice in 1996, and once in 1997. A fish inventory was performed at only one of these sites in 1996. This inventory was performed in the lower reaches of Anderson Creek and found Rainbow Trout (O. mykiss) and Sculpin (Cottidae). The fish survey shows that there were multiple age classes of Salmonid, which clearly indicate that salmonid spawning is occurring, there isn't really enough samples, time electrofishing, collected to determine the strength of the population to determine a high confidence level in salmonid spawning status. For this reason we originally selected "Not Assessed" for salmonid spawning status.

On the other hand Scriver Creek was probably assessed as "Not Assessed" accidentally. Forest Service's Baseline Inventory Found "Spawning Success" in 1986. Boise National Forest's Aquatic Survey Data Base shows Multiple age classes of both Rainbow and Brook Trout. There is no reason to believe Salmonid Spawning is anything but "Full Support"

The revised assessments

The revised assessment for salmonid spawning in both Anderson Creek and Scriver Creek is "Full Support". DEQ Boise Regional Office believes that water quality is not limiting salmon spawning in Anderson Creek

and Scriver Creek, and has made a commitment to further investigate the strength of the populations, in the Summer of 1999. It is my understanding that if Salmonid Spawning is found to be limited, TMDL type actions will be immediately taken.

Bacteria Data on Anderson Creek.

THE POLYMENT TOUR

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In 1997 while working on the Sub-basin Assessment for Middle Fork Payette River, someone stated that they were more worried about bacteria in Anderson Creek than anything else. We took a single bacteria sample from Anderson Creek from immediately above it's confluence with Middle Fork Payette River. Again One sample was taken on September 11 which is in the sampling window for primary contact recreation (May 1 to September 30). The sample exceeded the primary contact recreation criteria of 500/100 mL at any time, but not enough samples were taken to determine if 30 day period and geometric criteria had been exceeded. Although the sample exceeded a portion of the criteria, 560/100 mL, the samples exceedance is not at alarming levels. Since duration and frequency of exceedances are unknown and exceedance is not at an alarming level it was determined that this exceedance was minor and therefore does not downgrade the beneficial use. It may prove prudent to further examine bacterial levels in Anderson Creek.

Question 1. The text cites Parker (1990), however, is appears the analysis uses Parker (1982) equation, is this correct?

Yes, the equation used was Parker, 1982. This version was taken from the validation Andrews and Nankervis (1995) did in the Sierra Nevada batholith.

Question 2. For critical shear stress (τ^*), was significant particle motion or first motion assumed? A requirement of the Parker equation is that initial particle motion be considered if surface particle sizes are used, and phi is calculated using: $\phi i = \tau^*/(1.18*\tau^*)$

The D₅₀ considered in this model is the D₅₀ of the bedload. See the answer to questions 4 and 6 to understand how this is done.

Question 3. Where did constants to calculate t*, come from (need citation)?

The critical shear stress used is based on citations in peer-reviewed, published literature for granitic geology in the Sierra Nevada (Andrews and Nankervis, 1995).

Question 4. How was the input D_{50} determined which set the reference shear stress (τ^*) for the Parker potential movement calculations? And, is this value assumed to be the approximate D_{50} under background conditions or is it based on the existing conditions?

The D_{50} is both the result of the transport and affects the amount of transport. These must be consistent for each geometry, input amount, and particle size distribution modeled. Therefore, the D_{50} used was determined through iteration. The final D_{50} used was then compared with current observations of D_{50} for model validation. The D_{50} is relatively insensitive to the amount of input and particle size distribution, but is sensitive to channel geometry. This is because the transport rate is extremely sensitive to the D_{50} (i.e., a relatively small change in the D_{50} results in a large change in the channel transport rate).

Question 5. The mass per velocity column in the spreadsheet lists (Q/V), is there a Q_i or should it be Q_{ij} ?

Yes, this was a typo. It should be Q_{si}. The answer remains the same.

Question 6. How is (Q_b/V) (tons/meter) related to the substrate grain size distribution? This answer may be covered in one of the cited references. Because of the "gray" nature of some of the literature could DEQ provide a copy of the following references to help EPA expedite their review of the analysis: 1) Kinerson (1986); and 2) Andrews and Nankervis (1995)?

$$F_{bi} = \frac{Q_{bi}/V_i}{\sum Q_{bi}/V_i}$$

Where F_{bi} is the fraction of the bed in the ith size class.

I am certain that Ned Andrews would disagree with your classification of his paper as "gray". Andrews and Nankervis (1995) was peer-reviewed and published in an American Geophysical Union Monograph called "The Wolman Volume" Kinerson (1986) is a masters thesis. Copies of both of these papers can be found with Charlie Luce and Alan Barta at the Rocky Mountain Research Station, Boise, ID. Also, note that the units within the Excel spreadsheets are metric, not english.

Question 7. The deposition rates presented in Table 12 (main document), and Table 4, 11, and 12 (Appendix B) list different deposition rates. EPA assumes that the values listed in the spreadsheets are the actual numbers. Will this discrepancy change the final load capacities and allocations presented in the TMDL?

The differences between the values in the main document and those presented in Appendix B are that those in the main document are presented in English units and those in the appendix are in metric units (NOTE THE TONS/YR VS THE TONNES/YR IN THE COLUMN HEADINGS). The EPA can select either value, as long as you understand the associated units...your choice.

Question 8. What is the citation for the particle fall velocity calculation?

Richards (1982). I believe it is Stokes Law.

Question 9. Why is percent capacity used calculated for only the 1.4 to the 362 grain sizes?

The calculation was only used as a diagnostic when initially writing the spreadsheet and is not used for any further calculations. Consequently it was not updated to reflect the fact that the summation needed to handle smaller size fractions in lower gradient reaches.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION 10 1200 Sixth Avenue Seattle, WA 98101

Reply To

Attn Of: OW-134

June 17, 1999

Stephen West
Idaho Division of Environmental Quality
1445 N. Orchard
Boise, Idaho 83706

Dear Mr. West,

I understand there is interest in having follow up discussions regarding the Middle Fork Payette River and Lower Boise River TMDLs to resolve issues we discussed in our April 23 meeting. We share your interest in wrapping up these decisions as soon as possible.

To make sure we are clear on the critical issues as they currently stand, and ensure that future discussions are as effective as possible, I thought it would be valuable if EPA re-stated the options we offered in our earlier meetings (see attachments). If IDEQ could follow by providing a description of the approach you intend to take, and what specific issues need further discussion, we should be in a position to quickly resolve these differences, or be clear where we cannot agree.

Please contact Leigh Woodruff (378-5774) to set up a follow-up meeting.

Sincerely,

Timothy Hamlin, Manager Water Quality Unit

cc: Michael McIntyre, IDEQ
Dave Mabe, IDEQ

Attachments (2)

Attachment A

MF Pavette River TMDL Options

Option 1.

This option builds on the current approach outlined in the TMDL, and consists of four additional elements. In combination we believe these would make the TMDL approvable.

- a. additional rationale would be provided explaining how achieving the target deposition rate would achieve full support of coldwater biota and salmonid spawning uses (explanation provided to date, including reference to the USFS 100% above background target, does not establish such a linkage);
- additional hillslope targets would be established for each watershed process (mass wasting, surface erosion, bank erosion, etc.) by subwatershed to help direct implementation activities. EPA would be willing to work with IDEQ to identify and establish appropriate targets;
- c. specific commitments would be included in the TMDL to monitor improvements in water quality, including a time line for conducting monitoring; and
- d. a more comprehensive feedback loop process would be established in the TMDL including a schedule for completing the implementation and monitoring plans, conducting monitoring, assessing data, and a description of what will be done if the TMDL is not on track. One approach used in other TMDLs is to establish specific check in points, such as at 2, 5, 10, 15 yrs., etc. so that expectations are clear, and implementation, monitoring and evaluation can be more effectively planned.

Option 2.

This option consists of using a surrogate approach to setting TMDL targets:

- a. Desired instream conditions would be used to set measurable goals. Potential surrogates include: surface fines by textural facies; residual pool volume (i.e., volume of fine sediment stored in pools0; and pool frequency and depth (building on the existing pool survey of the impaired reach). Target levels could be set using upstream reaches meeting beneficial uses, and/or the USFS natural conditions database; and
- using sediment transport curves to set measurable and realistic bed-material load reductions.

Provisions c. and d. from Option 1 would also apply.

Option 3.

This options consists of using natural background sediment loading as a target for the TMDL. This option is predicated on the presumption that beneficial uses would be fully supported at natural background sediment loading rates. EPA recognizes that there are other factors contributing to beneficial use impairment (e.g., elevated water temperature). The expectation is

that reducing the sediment load will benefit specific aspects of the water quality problems, and that beneficial uses are likely to be fully supported at some point above natural background. Ongoing monitoring would be used to establish when full support is achieved, thereby achieving the goal of the TMDL.

Provisions c, and d. from Option 1 would also apply.

Attachment B

Lower Boise River TMDL Sediment Issues Summarv

Through discussions with IDEQ staff and others, it appears that solutions can be developed to address concerns raised with regard to bacterial WLA's for Nampa, Meridian, and Wilder, and allocations for sediment and bacteria for the Lower Boise River riparian area. These issues are not fully resolved, but analysis is underway and amendments to the TMDL are being drafted which we believe will satisfactorily address EPA's concerns.

Agreement has not been reached over concerns raised by EPA in the draft and final TMDL regarding the sediment TSS targets. In summary, our concerns have been:

- There is no information to substantiate that the water column TSS targets will resolve salmonid spawning impairments resulting from inadequate substrate conditions.
- Data from studies cited in the Sediment Problem Assessment suggests that adverse effects to sensitive life stages of salmonids and non-salmonids occur at TSS concentrations well below the 50 mg/l and 80 mg/l TSS targets established in the TMDL.

We believe there are three additions to the TMDL which would resolve these concerns:

- 1. IDEQ commitment to participate (not necessarily financially) in a study to evaluate the adverse effects of TSS in the Lower Boise River using in situ techniques, and use the results of the study to modify the targets if appropriate. There appears to be general agreement that such a study is valuable, and discussions have begun to outline the study, identify funding, etc. EPA has committed \$5,000 to this effort.
- 2. Commitment to conduct follow up monitoring to characterize bedload (no data currently exists) and substrate conditions. Such data would be used to refine or establish TMDL targets. Two meetings have been held amongst various agencies to develop this plan, and a draft of the plan should be circulated amongst the WAG, USGS, DEQ, BOR and EPA within one week. EPA has committed \$5,000 and staff support to this effort.
- 3. Addition of substrate targets (e.g. cobble embeddedness, surface fines, etc.) into the TMDL which would allow full support of salmonid spawning. It is expected that different targets would be set for different reaches of the river to reflect geomorphologic changes and changes in salmonid species usage, ie. trout whitefish. These targets would not change the current allocations or % sediment reductions needed.

Currently there is no commitment from IDEQ for any of these elements, but there seems to be general agreement on the value of a. and b. Incorporation of substrate targets into the TMDL appears to be the most problematic.

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December 23, 1999

Tim Hamlin, Water Quality Unit Manager U.S. Environmental Protection Agency Region 10
1200 Sixth Avenue
Seattle, WA 98101

RE: Middle Fork Payette River TMDL

Dear Mr. Hamlin:

RECEIVED DEC 2 3 1999

DIVISION OF ENVIRONMENTAL QUALITY BOISE REGIONAL OFFICE

This letter is in response to your June 17, 1999 letter regarding conditions for approval of the Middle Fork Payette River TMDL, submitted to EPA on December 31, 1998. This follows up meetings between DEQ and EPA on April 23 and August 12, 1999 to discuss EPAs concerns and their final resolution. We agree that your concerns are important, and upon careful consideration have prepared the following response, which we trust will result in EPA approval.

The DEQ agrees that a surrogate for the effect of sediment loading in the Middle Fork Payette River is useful and is the most reasonable and expeditious way to address EPAs concerns about the linkage between load reductions and attainment of water quality standards. In the interest of speedy resolution, the changes regarding use of a surrogate are incorporated in this letter rather than a revised document. Our discussions with EPA indicate that this format is acceptable.

The DEQ recognizes the desirability of better links between prescribed load reductions, attainment of water quality standard and support of uses. However, we have found the science does not currently exist to provide solid quantitative links when sediment is the pollutant. In order to address concerns over such a link, to provide more of a bridge between sediment load reductions and support of beneficial uses, DEQ will use a surrogate measure for the Middle Fork Payette River TMDL.

Based on DEQ's analysis of beneficial use support, it is our determination that the nature of impairment within the lower reaches (below Big Bulldog Creek) of the Middle Fork Payette River is a loss of adequate winter cover and migration habitat provided by deep pools. Therefore, with this letter, DEQ establishes a revised TMDL target framework for the Middle Fork Payette River, and sets a interim surrogate target of an increase in pool frequency within these lower reaches to an average of 2 pools, with a residual depth \geq 1.3 meters deep per km, and a minimum of no less than 3 such pools in any 3 km stretch.

Tim Hamfin, re: MF Payette December 23, 1999 Page 2

The value for this target is chosen based on comparisons to nearby Bear Valley Creek as upstream reaches of the MF Payette itself, due primarily to changes in gradient, are uncharacteristic of the potential further downstream in the impaired reach.

Setting a target for pool residual depth is a surrogate measure of sediment load. It is based upon the way in which sediment loading is affecting beneficial uses in the lower Middle Fork Payette, and reinforces the specified bedload transport reduction. The values specified are interim and subject to change when additional site-specific data support the need for revision. A pool inventory has been completed and will be fully evaluated with regard to revision of the target upon approval of the TMDL and establishment of a watershed advisory group (WAG). It is anticipated this will occur in spring of 2000.

Any revisions to the MF Payette TMDL will be provided in writing to EPA and all other recipients of the originally submitted document. The nature of the written revision — letter, appendix, substitute chapters — will be determined at the time of revision based upon the extent of the changes and clarity of record. The DEQ will also maintain a record of any changes in its files.

The target framework establishes the desired pool frequency (stated above) as the primary instream target for the Middle Fork Payette TMDL in order to achieve beneficial use support. We believe this surrogate provides a readily measured water quality goal for gaging improvement in over-wintering and migration habitat and the effectiveness of sediment load reductions.

Secondarily, methods to increase the frequency of deep pools are also identified. These methods include a decrease in sediment production from hillslope land use activities in the upper portions and tributaries of the Middle Fork (MF) Payette basin and possible instream structure construction. The later is identified as an option to be considered in implementation because it is recognized the load reductions alone may not suffice to achieve the pool frequency target. Such direct measures are not prescribed by the TMDL.

We believe addition of a desired frequency of deep pools as a surrogate does all that should be expected or is needed at this time to bridge the gap between sediment reduction and recovery of beneficial uses in the MF Payette. We maintain that this surrogate is site-specific, thus not applicable elsewhere without analysis of conditions in that other locale. We believe it is a measurable goal that provides a more practical gage of the trajectory of water quality restoration in the MF Payette than modeling or measurement of sediment loads alone. However, it is not a substitute for the load reductions laid out in the TMDL and is not, by itself, a measure to determine whether individual activities are in compliance or allowable under the TMDL. Prescribed reductions in hillslope sediment loads are to serve that purpose.

Tim Hamlin, re: MF Payette December 23, 1999 Page 3

The DEQ further asserts that the definitive measure of compliance with Idaho's narrative criteria is support of beneficial uses. This we determine through direct biological assessment. At such time as full support of uses is determined to occur the surrogate target and further load reductions becomes moot.

In addition to the above, corrections to tables need to be made to the TMDL proper. The affected tables are as follows:

- Revised Tables 12,13, and 14 in the main document
- Revised Tables 4, 5, and 10 in Appendix B
- Correct Tables 11a through 12g, bed sediment transport spreadsheets, for Appendix B

The attached table revisions reflect conversion from metric tonnes to English tons. The attached tables 11a through 12g are what appeared in the draft TMDL; correcting a mistake made by inserting an earlier version in the final document. Please take the above indented text and these attachments as amendments to Middle Fork Payette River TMDL.

The 1998 TMDL document specifies hillslope sediment targets for each of the contributing areas to the impaired reaches. The DEQ believes these hillslope sediment targets, in combination with the pool frequency target specified in this letter, are adequate to meet the requirements of the Clean Water Act. It was our understanding, subsequent to our meeting on April 23, 1999, that EPA did as well.

The addition of a surrogate target was presented as option two in EPA's letter of June 17, 1999. We note that you specified four provisions, a-d, under option two in that letter. Our recollection of our April 23, 1999 discussion with EPA is that option two would consist of only provision a, specification of desired instream conditions, as addressed above.

Provisions b, c, and, d of your June 17, 1999 came as a surprise to DEQ. As discussed on Aug 12, 1999, the remainder of this letter addresses DEQ's response to those three additional provisions, provided for the administrative record only, not as amendment to the TMDL.

Provision b. "using sediment transport curves to set measurable and realistic bed-material load reductions."

The DEQ commits to participate in a study to evaluate the use of sediment transport curves to establish a better linkage between hillslope sediment targets and desired conditions in the lower reaches of the Middle Fork Payette River. The extent of this participation will be limited to staff time. Upon completion of the study, the DEQ agrees to evaluate the results and determine whether or not the current hillslope sediment targets are appropriate and to use the results of the study to modify the targets if appropriate. This commitment does not mean DEQ endorses sediment transport curves as the only means to set meaningful goals for sediment load reductions.

Tim Hamlin, re: MF Payette

December 23, 1999

Page 4

Provision c. specific commitment would be included in the TMDL to monitor improvements in water quality.

This provisions speaks to what DEQ intends to cover in the implementation plan and goes beyond what is currently required in a TMDL. We do intend to continue BURP monitoring on a regular five cycle in accordance with current DEQ program goals. This will include the MF Payette River. Furthermore, in setting a surrogate as a measurable goal DEQ will monitor that surrogate in the MF Payette River as well. However, further details of monitoring specific to the MF Payette River will be addressed in the implementation plan (see below).

Provision d. This provision basically requests more detail on a feedback loop for TMDL revision.

Much of what EPA seeks here will be addressed in a separate and subsequent implementation plan. Therefore no additions, addenda, or errata are made to the current TMDL on this matter.

By state law DEQ is obligated to work with local stakeholders and designated land management agencies in the development of implementation plans to control non-point source pollutants. In accordance with current DEQ program guidance ("Guidance for Development of Total Maximum Daily Loads", a copy of which has been provided to you) such a plan for the Middle Fork Payette River TMDL is to be completed within 18 months of final EPA approval. That guidance provides considerable detail as to the content of an implementation plan. We also have plans to develop a companion implementation plan guidance document which will more specifically address TMDL revision.

The DEQ recognizes, as does EPA, that development of most TMDLs will be an iterative process and that any TMDL can and should be revised based upon better information or analysis. This is addressed in DEQ's TMDL guidance document as well. We fully intend to make use of new and better information to improve all our TMDLs, our public demands it. We have made a specific commitment to do so in the present case in response to provision b above. However, it must be recognized by all that our ability to revise any TMDL is constrained by a heavy workload in developing round 1 TMDLs for the next six years, at least.

Tim Hamlin, re: MF Payette

December 23, 1999

Page 5

We believe we have been reasonable in reaching resolution of your conditions to the best of our ability at this time. Please accept this letter and its attachments as our formal response to your concerns, and, where indicated, amendment to the Middle Fork Payette TMDL. We look forward to your final approval of that TMDL and moving on to cooperative efforts in the actual work of implementation.

Sincerely,

David Mabe

State Water Quality Program Administrator

DM:de:ig

Enclosure

cc: Randall Smith, EPA Reg 10, Director Office of Water
Leigh Woodruff, EPA Idaho Operations Office, TMDL Coordinator
Stephen West, DEQ Boise Regional Administrator
Michael McIntyre, DEQ Surface Water Program Manager
Don Essig, DEQ TMDL Program Manager

Subbasin Assessment and Total Maximum Daily Load for the Middle Fork Payette River (Submitted December, 1998)

: Errata 🖟

Page 43, Table 12 Table 12: Sediment Input Rate Results by Reach

	Background	Background	Target Rate	Load	Cumulative
•	Input Entering	Rate of	of	Capacity	the state of the s
, 19 , 19	MF Payette	Deposition	Deposition	(% above	Load Capacity* (% above
Reach	(tons/yr)	(tons/yr)	(tons/yr) 🔞 🎉	background	7. 2 24 A 2 A
RI	103	6.1	9.1	50	13 (13)
	35	6.3	94		50
ម ``	96	43		44	48
! 4	23		6.4	46	47
	2 arrest do la contrata	0.9	1.3	50 ⊋ಕ್ರೇಷ	47 184 403 2 3 3 3 3
5	76	17.9	26.8	56 ******	
l6	61		59.2	11. 12. 12. 12. 12. 12. 12. 12. 12. 12.	# 19 ⁴⁹ . X
.7			50	26 	45
Daned	ises to Roised be		48.7 🦠	48	46

Based on increases to BoiSed background amounts delivered to each stream reach.

Page 44, Table 13:

Table 13: Load Capacity, MOS, and Management

Reach	Cumulative Cumulative Load Capacity Load (% above Capacity background) (tons/yr)	Cumulative Background Load (tons/yr)	Cumulative Margin of Safety (tons/yr)	Cumulative Management Allocation	Cumulative Management Allocation (%
RI 22 23	50 4624 48 5566	3083 3761	462 557	(tons/yr) 1079 1248	above bkgrd) 35
4	47 10125 47 11762	6888 8002	1013 May 9 \$ 1176	2224 *	32 32 32 32 32 32 32 32 32 32 32 32 32 3
.6 ≒}** -	49 13377 45 14960 46 16746	8978 10317 11470	1338 1496 1675	2147	34 31

Page 45, Table 14:

Table 14: Current Cumulative Sediment Loads, Cumulative Management Allocations, and Required Sediment Load Reductions*

		755 7 77 76 Way . • • •	
	Cumulative	Cumulative	Required
	Current Load	Management	Sediment
	Estimate (%	Allocation (%	Load Reduction
Reac	above bkgmd)	above bkgmd)	(% above bkgrnd)
RI	35	35	
R2	39	33	
R3	62	32	20
R4	64	32	32
R5	54	34	20 was the same that the same
R6	67		
R7	65	31	34
	•		

^{*}Current load estimate for percent above background based on SedMod (Boise Cascade, 1998).

Page B9, Table 4 (Appendix B):

Table 4: Sediment Input Rate Results by Reach

Rea	Background Input Entering MF Payette ch (tons/yr)	-	Target Rate of Deposition (tons/yr)	Load Capacity (% above background)	Cumulative Load Capacity* (% above background)
R1 R2 R3 R4	103 35 96 23	6.1 6.3 4.3	9.1 9.4 6.4 1.3	50 44 46	50 48 47 47
R5 R6 R7	76 61 75	17.9 39.5 32.5	26.8 59.2 48.7		49 45 46

^{*}Based on increases to BoiSed background amounts delivered to each stream reach

Page B9, Table 5 (Appendix B):

Table 5: Load Capacity, MOS, and Management Targets

100%	(% above	* Capacity ***	Background Load	Margin of Safety	Management Management Allocation Allocation (%
7	background)	(tons/vr)	(tons/yr)	(tons/yr)	(tons/vr) above bkerd)
_ 60%	50	4624	3083	462	1079
3 6	18 17	5566	3761	557	1248 33
	7	10125	6888	1013	2224
5 4		11762	8002	1176	2584 32
_		13377 14960	8978 10317	1338	3061 34

Page B12, Table 10 (Appendix B):
Table 10: Current Cumulative Sediment Loads, Cumulative Management Allocations, and Required Sediment Load Reductions

	mention property with the second	Service Control of the The second secon	The same of the sa		
	126.22 min 200.00 m	mulative erent Load	Cumulative Management	Required Sediment	
Re		timate (% ove bkgrnd)	Allocation (%	Load Red	uction
RI R2	35		above bkgrnd) 35	(% above 0	bkgmd)
R3	39 62	#4.	93 92	6 30	
R4 R5	64 54		32	32	
R6 R7	67		31	36	
*()			31	34	

Current load estimate for percent above background based on SedMod (Boise Cascade, 1998).

Pages B13-26, Tables 11 and 12 (Appendix B) (see attached Excel sheets)

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ent of Red < 1.8 mm ent of Red < 3.7 mm ent of Red < 11 mm er of Red < 11 mm er of Red < 11 mm er of Red < 11 mm er of Red < 11 mm	Tarigan 1*2 median 1*2 median	file phi med (dimin)	en i)	(Brolout)	% median (m Tr) 4.338-03	(m^3/s) 9:06	(64/1) (64/1) 2.688149	Per 2 year stores Qb total (Tomosty) 1,518+01	• .			
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Table 116 Prach ? Transport Capacity Under Background Conditions (1) - 11 /04 F

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128	317		3.692-01	0151	3.8H-11	J.008-15	E.008	1.13B-13	U do	1.003	₩e
214	314	361	7,358.01	4.075	3.0世・12	2,768-16	9.008	1.06E-14	0.00	1.449	No
	·		7.78 St 1947 4		•			1.046-14	9 Ob	7 006	No
(Te reme leje											
Mean			Parker	Parker							
करें र में क्रमेंक	Primary	Tributary	Relative	Potential					14 of Brd		
ture in Fraction	Input	Engeal	Movement	Movement	Cortesi				From		
(mrs)	(lonner/yı)	(Tonnewyr)	(Kah)	(Tennentry)	(Tormer'se)	Deputited	Bedlesd	mate/yelecity	Particles	والراسي	Appres
6.3	39	7	Boopendre	Supraded		(Termet/ye)	(femeralys)	Q)/VI	in Metion		
0.4	39	,	134		. 46	•	Supended.	Tunpende d	Sespenda	0%	
0.7	39	'n		106	46	•	46.306	50-38S.C	313		
(4	10	ź	347	501	46	•	46,306	6.17E-64		556	
72	10	,	131 '	. 97	46	•	46 306	4 118.04	314	1616	. •
		, <u>,</u>	100	. 11	. 36	i	31.610		414	, 14%	-
53	4#	•	~ N ~ %	- 49	. 44	i		6.400.04	511	214	
11.1	12)	26	. 18	18	i	49 615	1.35世-05	6146	32%	
22 K	15	. 3	1 3			-	110)5		. 114	14%	£0
41.1	1	3	0	٠.		17	8 436	1.138-03	1196	3514	••
90 %	Đ	i	•		•		9 000 y 🔄	1.358-05	3158	66%	
(Re a	n .	i	•	•	•	1 1	0.000	1.358-0)	1895	7794	•
362 0	a .		Ÿ	•	. 0	1 1	9.005	1.352-03	1134	7796 8996	
	v	•		. •	•	i					
	v	'	Total 642	. •	•	Total 11 E	0.000	1.132-03	WI	100%	
	0	•	Total 642	. •	•	Tale! 35.8		1.132-03			D10 (f ==)

Die it se

Falle [1] Reach 7 Hansport Ceparity (Index Nackground Conditions

Channel Width . w (m) Slope S (m'm)		26 5	CONTRACTOR CO	表 文字	ilana a						
Welled Paintelet - F [m]	0	101101	Mitmeine a pr	.0000	Input Partic	de Signa					
(f renmelet - P [m)	•	79.2	Flow (many)	79.2	min	Reg	B		_		
Liou Section Ates in WS - A (m*2)	•		Add (m*2)		(Rider)	(mm)	Percentage	Tonnerly	. I.		
") Traville Radius - D (m)		47.3	Flow (sens)	341	0.125	0 23	ं (शा क्		'		
[14] 15 of Sepure 473 to		160 .	Paneral Diffig.	3. 49.4	0 25		13.00%	2 74	-1		
Acceleration of the color - a - 1 and		0.16	200	Die 0.12	8.5	0,3	13.00%	8.84	1		
Committee of Wight Labor that was the		9 R F		8	1 7	1	13.00%		ſ		
TOTAL STREET STREET IN APRIL		1000			· •	2	13.00%	3.04	- 1		
Dennity of Sediment - ther (14/m*3)		16.7	TRINITARY SU	UT TO REACH			FB.00%	. 8 84	J		
Spent Laponith (glaf New, e)	•	2700	1, and (1961, 5,1)	_ 31	[<u>•</u>	R .	16.00%	6.8p			
bledin firnin Sier .450 (mm)		05167	Hitered There's		()	16		10 72	1		
Charles of the William of the Canada)	•	16	Marri (94 ebe f)	he 916	14	32	6.0016	4.00	1		
Creamt of Red e 1 d mm		18%	Moni (1/mi*3)		51	64	3.90%	J. fa	1	•	
Percent of Red at 8 mm			Buckground .	*00	`64	128	J.0014	3.40	1		
Percent of fied a 5.3 mm		14%	Management	40 m	130		2.00%	1.36	ſ		
Cerred of Red a 11 mm		35%	46	Salara 🕽 🐞	756	356	3.00%		j.		
		44%	10 mg 10 mg 10 mg 10 mg 10 mg 10 mg 10 mg 10 mg 10 mg 10 mg 10 mg 10 mg 10 mg 10 mg 10 mg 10 mg 10 mg 10 mg 10 10 mg 10	SANGE.		312	7.00%	1.36			
TARRER FORMATHOS FORMS PRINTINGS TRAN			The said to	spirate.			100,0016	t.36	ſ		
1°mrdian			14.14.14.14.1	\$ T				· · · · · · · · · · · · · · · · · · ·	1		
(dimless)	I'r median	المعالم المعالم	1	. **					_		
	(dimleer)	Lucian and th	Water lines	qh medien			San Barre				
10 311 9	3.762-01	(direje se)	(dintre)		Q4 total	Q4 (pts)	For 2 year stores				
		1.61430	4.330e3 38	(m 2/g)	(m*3/6)	(ta/s)	Qh total				
PEACETA TROOPERS TERRAL PORT PARTIES	16.7 E			7,178-05	0.04		(Tenantalyr)				
Manimum		•	44.0	QC Q202.		3.108180	4.482+02	•			
Chain	Plan included	Cenmetric			r≹csýr	11.0					
Seta	Chain	Menn	20.37	80		14.7					
De Fraction	34pp		4.98		2 × 250 h	Parker	B. a				
	In Freetige	of Cirolin	192-7	phin .	. 8.7	Poloniial	Parker	Poker	Petrolisi	_	
(/nm)	(mm)	Sira in Fraction	I'r ith Bertien			Maryinesi	Particle	Petential			
0131	0.75	(eup)	*	ith fraction	*	PH WE WILL	Velocity	Palume	Man	Palf	Particle
0.25		0.2	4.378-64	4.00	. 101		VÍ.	QL	QM	Velocity	2mbrieges 2mbrieges
Pή	D ¥	0.4		144.554	1.12101	41 (11 3/1)	(n/hr)	ablan a rece	H(vel)*H	We	Patrick C
1	1	0.7	3.6 (4.8)	73.385	1.15+0)	1.412.03		4H, A 64, 14)	(kg/s)	(m/r)	
,	7 -	1.6	718.03	34,544		1.306.05	T 026	3.748-92	101.01	0.014	W1>117
	4		3.418-41	18.34g	4.0840)	1318-01	1.310	3.652.02	98.49		Yes
<u>.</u>		28	6.00E-05	7.311	y.igagg	1.148.03		3.478.02	93.62	0.063	H,
	14	\$7	1.) JP 02		7.42+00	9.55E-04	7.571	3.138.62		0.009	No
M	32	M	2.702.02	4.678	4,7E+pp	6 97/5.01	6.176	2,538-01	\$4.4g	9.111	N.
12	64	2)	J.172-62	2.34#	1.68100	3.9HE-84	3.090	1.612.02	66 36	0.177	No
44		45,	1.078.61	\$ J.P79 🐬	2,42-02		1.315	1.512.01	43,40	0.711	Ne
128	121	91		0.392	1.6E-06	J.842-06	0 020		14.9g	0.335	No
236	236	18)	2 132-01	4.797	1.18-49	2.09E-10	0.000	9 06E-05	6 32	0.101	
	512	342	1.258-01	0.149	1.78-11	1,1)8,73	0.00p	3.55E-bp	1 pg	0.709	No
Drome frie			1.44E-0	0.073		2 218 5	9.000	4.058.12	0.00	1.003	No
Alega		·	100		f.UE-12	2.27E-14	0.000	5.87g. ₁₄	9.00		Me
			, de 1				A-MAG	4.01E-15	0.00	t.ery	No
of flows	Primary		Parker	. Bart. 66				- ·-	-,	1.004	No
Size in Fraction		Tributary	Parker Relative	Piker 🐎							
(rvn)	Input	Lapet	Manager 201	Potential *			and a				
0.7	(Former'))	[Totales/ye]	Movement	Mavement	Output	=	1237	1	e of Red		
0.4	46		(K#/)	Tomanaha) a	(Telephon)	Deposited	Brillagi		From		
0.7	46			Service de la Constitución de la		(Tonneyy)	(loruse) ₍₁₎	tersivelecity	white i		
14	46		M	107	31	Tiga (jarjeka)		OVVI .	Metter 1		Approx
	46	•)))		Jun-	Berginstell			<u> (150</u>
2.1	16		M.com	101	ỗ ૅૅડ	The second	33.14	7.138.04	preside 1	ON TO	887; T
5.7	49	7		? }	31		× 55.146	7.500.04	5%	#	
11.3		H	41	× 75	312		31.16	R.HR.M.	16% (19	716	78. 13.
72.4	ia .	4		0	42.5		A SE SELECTION		4 11	10%	M
45.3	0 "	3	15	6 16 S	3 8835			3,018.04	4%	24%	\$
Ψη ς	0 .	5	0 (1)	** o *** **	·豐麗(1944	 	14.44	1.398.03	tin. Sec.	1)% ×	
181 m	0	_	1.00		7 7	(1) 4 (1) (2)		1.915-63	Diame		\$
	ó	!	0		· *	1	6.117	1.39% 41		44 ×	14. 24
			777	Size 🔛 Harri Taka X	. 🗯 SEKARET 🖰	004 :::::::::::::::::::::::::::::::::::		5 - Care		37%	₩ .
343.0	ó	•	0	j m. <u></u>	X#48080K : 9	CONTROL - B SECON TRANSPORTED TO					
	0	i	0	0	•		1000	a same a b COSS		6746	to No.
	o	i	0	9	•	1 7	1000	1.398-6)	llu 🔻	674. 1911	die School ver
	Ó	· · · · ·	Total 400	9	•	Tedn) .	1.000	(.)98-0) * (.)98-0) *	llu 🌸		<u>.</u> 20 12

PT or Office proper process to appropriately				*			100	ر ۾ ان ڪا تامي جو ان اور آ				
Channel Width - a (m)		Je	r . 1961	ARTHURN Y	HER	luput Particle			· 			
Ships 5 (m/m)		0 0 101		Manager a	0.066	MAIN.			3 1			
Wester Lammetel L (m)			100	Flow (cont)	11.1		NOTE OF	Percenten	e e e e e e e e e e e e e e e e e e e	- 1		
Little Section Area to WS / A (mrz)		16.9		A# (m*3)	24.5	(===)	(may)	- 3 (m. (m.)	Thereby	ł		
Hydrantie Ruding - It (m)		10-4		Flow (tome)		9 925	0.33	1398	all and a great section of	- 1		
Depth of Scour + 121 R		0 #3		Constant targe	U.2	0.23	£.0	1394	13.06	ľ		
Acceluation of theory - g (min's)		0.21	1.1	11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	4006 -013	₩3 %	1 36		## 06	1		
Henry of Water - the (Laim 3)		9 8]	30.8	71.77		1 1	3 0		11 06	T		-
Red Shou Shore . th (Ta)) pop	, Pil	PHULARY &		3 '		1316	F9 04	1.		
Dennity of Sediment - ther (kg/m*3)		#10	.753	A4+(m/-2)	11 THE RESERVE THE RESERVE TO A SECOND SECON	4	7 .	1044	J.3.00	f.		
Sheet Victority (11-6)(m/s)		2700	A.		70.1			16%	27 22	1		
Such a street h (11.6)(44%)		0 99877	s in the	Physical (1) and	7) 11	16.	16 .	44	- 3.33	f		
Aledian thain Sire at B (min)		7)		Plant (N. ster	Mrg 30%	1 55	33	391		Į.		
Fersont of Red of Lidmon	1.	394		i designations	2	##	64 (%)	354	631	1.		
Percent of Red of J. I. mm		374		Probates	95		i de l	796	6.93	1.	14	
Freed of fird a 5.7 mm		15%) Henry	- 6	178.5	236	216	2.74	1 1		
recent of Bed < \$1 mm			with the second	11.70 2 1.00		236	312	7%	7:74	1		
•		11.7	2.1	マン 毎年 1988	M86.3544				2:16			
APPER POPULITOR TOTAL PROLOGO TRANSFORT			_		(%)			10014				
Campian				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	lg, yekir			_		<i>1</i>		
(dimfee)	l's median		phi_media	on Man	100 m			_				
	[dimilees]		(dimire)	An and friedly	(a) the all an expension of	Q* fotal.	AL	For 1 year close				
\$ 00E 01	3.762-02	***************************************	1.33474	100	(M/2A)	(m°36)	Óp total	Ql total				
			1,71874	. d (() () () () () () () ()	A ME 43		(kp/r)	(Tormenlys)				
PACIS SIZE OF ANY STANSFORT CASCING ASTRONO						P.(0)	3.80E+00	1.788/97	-			
Minenium	Maninum			W 14		1.7	· · · · · ·	v.tuBs &				
(Iyain		å.	(Nameb)			100						
Sire	Clean	9.4	Mann	Ches Z-2	10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		Parker					
in Fraction	Nisa	1.*	of Charle					Parket	Parker	_		
	in Fraction		Size in Fraci		H	·	Patental	Partiele	Potential	Potential	Particle	
((PHTH)		(gen)	the strain of the Break.	Marian	` w q ' '	Movement	Velocite		Марр	74	Pullele
0 171	0 73			200 A 100 A			7" wit +130,	W	Volume	QH	Witness	
0.25	0.3		0.2	《《文字》《 《中华·65	310,330		41 (14 (14)	(19/4)	OH.	(Joken) They	W ₁	Seeprooder
n s	. Ĭ		- , ⊕.4 .)	I Alb 44		1.18401	. I. ME-01		white (m's/s)	(AN)		
1		1960	. * j . 9.7	1,242.41	306,379	Literal	P.97E-03	174.769	I July 10	471.54		(We > U%
,	7	4.4.	1.4	AT A SECURITION OF THE PARTY OF	133,740	1.18+01	9.038.03	175 902	0.57E-#1		0.044	Yee
	•		2.H 🐇	7.438.04	#2.1ey	Littlet	9178-01	172.597	1.148.01	#27,61	9 063	Yes
•		j. ``	5.7	1400.41	33.714	100101		167.001	J.505-01	418 MJ	9.009	Yes
	16		- 11	2968-01	18 937	7.02 - 00	7.05H.03	138,791		403.43	0.123	Ne
16	31			人型作的	8.199	7.15100	D.00(E-0)	141,040	1.47E-91	383.49	0.177	
17	61		2)	3 172.07	4 267		6.40E-0)	113,276	1.378-01	342 50	0 251	Nu
. 	128		- 45	FIGURE	2 162	4.3B+66	3.86E-93	87,749	1,50g.ej	271,14		Me
124		. :	91	A CASE III		1.32100	1.132-01		6.040-63	163.61	0.335	Ne
256.	116	1. 2.		L.168-61	1.074	69E-01	4.27E-04	20.(0)	1.005-61		0.502	No
	312	3.7	362		0.34g	3 (X.0)	# 628-10	€ 110	9.94E-05	48 55	4.199	Ne
Cleametric		7		1,1144	. ANC	J.JE-10		0.00g	7.162-00	0 27	1.003	No
			124.1 - 1 - 1 - 1 - 1	4 7 TU		•	3.728-13	8.000	1.20g-17	9.60	1,419	N.
Alena				Call Market Lands					sale-13	0.00	3.005	No.
of flynin	Primary		T. B.	Portue	Pate	day				•		144
Sire in Freetica	degent	•	Tributny	Robbine	Polonial	Ų.		1380				
(me)	(fourer/yr)		- puber	Meranana	Meyenned	Maria No.		33	7	Not Per		
0 7			(Laustin, II.)	(Reb)		Delgat	Deposited		3	Prom	11 1	
0.4	0		11 (4)	Electric Control	(Termsym)	(Commercial)	(Tonera'yr)	2 Brillood	James Strategy			
	0		14		- Description	S II SOM	71-101-11)	(remarks)	CKY	Perticles	montelle	Appear
17 17	-	1	10 899		Superint .			- Supposed	Empressive	le Maties	Min Deal	D30
• 14	•			en andre State of State of St	Improduk		. •	Samueled		Samples	. ***	
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f 4 78	0		13		12	4.85 THE C \$1,530	ੂ ■	ا الماسيون	Contract of the last of the la	Surpossible :		
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DE AL MONTO AND PERSONS AND CONSTAN			S 1 1	100 TOP					۷			
Thannet Wedth . w [rm]	19		1.5, 47	CONTRACTOR				100	1 A	1.75%		
Sloper 5 (m/m)		16	- 442.77	OF CHANGE Y COM		Input Park	rie Siene			. Ale		
Wanted Street		9 0063		Manager	8.04	ساسد		1 1		****		.*
Welled Feameler . P (m)		14.3	3.8 × 3	Flow (emp)	17 7	(mm)	and the second	Proceeding	T			
Lett Section Area to WS - A (m17)		11.5	gur Mirag	An (m²)	74		(mm)	(res)	Teres	4.6	1,000	de .
fiedrunte Radine : R (m)			100	Flow (2000)	26 7	0 1 25	🐎 " - D 35	13.00%		ALPRE CO	#	4.3
Depth of Scour = 1/4.8		0 7 1	T (122)	Present Differe		0.75	. 0.5	13,6098		1		
Acceleration of thursby on (m/s-2)		0.24		880 INT 1867 BUT BUT BUT BUT BUT BUT BUT BUT BUT BUT	· · · • ? ? ?		Si Gara		5.9	# 26°C	277	
Dennity of Water . sho (bg. mr3)		98)	1 (1)		豐"			13.00%	[%] E 5.#1	k 🚮 📖	4/4/E	1831
Red Sheer Strees - th (Pa)	.*	Imag						13.00%		ew.	. લો	+ 1
Then were value - IN (La)		i eją 👑	548.30	SEROTARY NO.	THE REAL PROPERTY.		્રે [®] ે • •	10 80%				13.8
Dennity of Sediment - they (kg/m*3) .		270a	নুকা (), জা		A STATE OF THE STA	(基別部) (1) 、 (タリ		16.00%				
apriet galacete (glick Remis)	_			Marrie (Timby		1	35.2	5.00%	<u>, 7,17</u>		Y	
Sedles Grafa Sire of 10 (mm)		0.00484		March (N. 1840)		16			7.76	38 and 1	de vo	
errent of fled e f 4 mm		30 📆 :		I feet (Disability	46 (41)	J#		J. 00%	2.30	Salar i	\$10	· · · · .
ferent of Red & 7 8 mm		714	1.46			64		5.00%	2.30		4947	÷ : ; + ;
The state of the s		¥13%		Parkground 2	25 m	178	120	2 90% ³	9.92		1.5%	Turn Harabert
recent of fled a 5.7 mm		11%		Manager and Confession of the	20 14		256	2.00%			*	
recent of Ded at 11 mans					24	** ****	317	7.00%	0.53	- AS	•	
		14%	***************************************			L	· · · · · · · · · · · · · · · · · · ·		942	ł		
APPER FOUNDING SET SET WITH A HOTEL RESERVE		•	1 (19)	also Table		Bernera Bernera		100.00%				
TOTAL PRINCIPAL INAMEN	H F		100		K	Ser. 7						
i median	("I menjen	-44	_median			PRES.			-			_
(donless)	(dinters)			W. Containing	gb mydiae	N me a		For 1 year stee	_ :			
3 3 (E-0)	3.76E-07		imiere)	(dintra)		ON THIS	Qt total	Qb total	·			
	3.76E-03	· Ï.	\$2096	The state of the s	(m 2/e)	(MC*9/M)	(tub)		ì			
4611 4776 44 444 44 444			1.3	0.1894	A 1.05E-04	9.00		(Tonneryyr)				
FACILITY CARREST AND TRANSFORT CALCULATIONS	9	i.				223	\$.74E+06	(1998) 81	-	4.64		
Minimum	Rfacionum							,	-			
Christ	(frain		DOME DAY				jr %.			**		
Stre			Megn				Parkey	**				
in Fraction	Sire	o)	(Syminy			2	Potential	Parker	Poker	Page at		
(mm)	in Fraction	Size i	a Fraction		₩	00 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -		Perticie	Petratia	Potenti	l Indiah	
	(mm)		(mm)	t"s NA freetiess	On Providen	37 44	Mavement	Velocity		74407	Page 1	Posticle
0175	0 25					er Crame an	per mit with	VI VI	Volume	ON	Velocity	
0.75			0.2	1.30E.41	* 392 30g		(m'2/s)		QH	hi(neg)-,	W.	Superidid
0.1	0 5		0.4	3 Jiwa		1.12171	6.35E-03	<u>(-/v)</u>		// (Aug/s)		40.0
4	. 1		0.7		176.971	I. (Evo)	E STATE OF	97,173	1:038-01		(19/0)	{\$\begin{subarray}{c} \partial \pa
	7		1.0	5.40E-et	74 P)	1.12101	5.278-03	76.747	Forg-of	4.44.24	. P44	Yes
,	4		2.8	1.068-07	48.634	1.864.01		94,480			0.063	Yes
•				2 HEAT	77.931		1.9(E-0)	90,997	9.948.02		D Dire	
E Company			37	4.2346-01		9.48×00	3.518.01		9.34E-03		0.125	He
16	16		11 42734	8 30H-41	12.567	E32100	4.77E.03	#4,359	#.37E-01	230,33		No
D.	33		11		4785	6.98100		72.361	7.602-01		P 177	No
•	64		65	1.691.01	D. J.153	2.92140	3 415-03	37.204	5.498-02	205.20	4:251	No
64	128 .		-	J.) 74 an	1.5ha		1.65B-03	25:227		148,73	0.131	Ne
179	716		91 · 🎎	4.778 No. 288	1791	4 79-41	3418-04	3.604	2.632-03	71.44	0.302	
716		- 1	IJI 🕽	1.348-07		* 18 05	ijiem		3 ME-43	10.50		No.
· - ·	517	1	(6) (A)		0.799	1.7E/00	7.948-13	i d 9.00) 🦠	E.J39-07		0.70p	No
		-		2464	#1 #.20h	7.08-11		9.000	1 50R-10	0.00	1.00)	He
Ciermelpic				7.0			4.468.14	0.000		\$ 0g	1.419	No
Aleum				200					7.188-13	9.00	2.504	
of their	B-2			Parker 💖	All Marie							Me
Size to Fraction	Primary	Teibe	diery	Helativa	Parker							
(First)	" fupul		pul		Patential	Es ·			10 to 10 to	W		
	Tormes/yr)		168 (IA)	Hevenant	Marriage	Output	5 <u>2</u> 3 5 5 5			N of Bed		•
.0 7	13	1.00	<u>~ *'T'/ </u>	(K•/I)	Manager 1		Deposited	Breland		From		
P-4	1.0		,	Supraged Service		(Temper/ye)	(Termentar)		=muvrlock		modely	A
41			š	Samonded	X	24		Charlen (h.)	<u>(X/</u> Vr	in Melina	Maria Con -	Approx
· ·	18		j '		Terrories .	74	- W.T.	Surpreded	Juspended		Intered	<u>D3e</u>
44	18		ŧ	263	2 9)	24	- 5 ♥ -6-7 ▼	Superior	September	Superior	414	
14					201	20	<i>\$</i> ₩•0	34.041		Japan,	954	
2 M	ii		į.	751								
7 T 5 T	16	9	į.	140	46 oc. 1, 100				and the second	(*** 3% €	34	
2 M	14 77			140	, u	PIL.		74 947	J.028.05		3%	
7 T 5 T	14 77 k	9 9 7		740 - 140 703	ej To		* 0	74-947 (A. 694	3.028-05 2.308-05	3% %	974	es X
27 57 113 226	14 77 R 7	9 7 3	, .	740 703 F48	, u	PIL.		74 947	J.078.03 2.30%-05	1% ×	9% 13%	48 S.
) 7 5	14 77 k	9 7 2		340 203 648 77	. 61 10 . 30	PE	* 0	74-947 (n. 193 29.395	1.022.05 1.102.05 4.402.05	3% 4% 7%	974	1.4
72 57 113 726 453 905	14 77 R 7	2 7 2 2		740 703 F48	t) 19 30	PE		74 947 (A. 693 29:395 Fl. 965	J.1028.05 2.108.05 4.408.05 2.418.05	7% 414	9% 13%	13. S.
27 57 113 226 453 403 1810	14 77 R 7 7	2 3 3 3 2 1	i - - -	340 203 648 77	. 61 10 . 30	PE		74 947 (8.099 27.39) 11.000 5240	1.022.05 1.102.05 4.402.05	3% 4% 7%	9% 13% 24% 24%	13. S.
72 57 113 726 453 905	14 77 R 7 7 0	9 7 3 2 1 1		740 295 F48 77 10	. 61 10 . 30	PE		71947 (8.694 28.395 Fl.005 \$249 \$275	J.1028.05 2.108.05 4.408.05 2.418.05	7% 444 7% 443 294	9% 13% 26% 24% 31%	€₹. ¥.
27 57 113 226 453 403 1810	14 77 R 7 7	2 3 3 3 3 1 1		740 295 F48 77 10	. 61 10 . 30	PE		74 947 (8.099 27.39) 11.000 5240	1.078.05 1.198.05 1.408.05 2.138.05 4.138.05	7% 404 7% 405 294 17%	9% 13% 21% 24% 31% (9%	48 S.
27 57 113 226 453 403 1810	14 77 R 7 7 0	2 2 1 1	-	140 205 F48 77 10 0	. 61 10 . 30	PE		71947 (8.694 28.395 Fl.005 \$249 \$275	1,078-01 1,198-01 1,488-03 1,418-03 4,178-03 1,198-04	194 194 196 405 296 1794 1795	9% 13% 26% 24% 31% 49% 65%	हरी. चं.
2 T 5 T 11 S 22 G 45 T 90 S 181 O	14 77 R 7 7 0	2 2 2 1 1		740 295 F48 77 10	. 61 10 . 30	PE		74-047 (A. egg 28-399 11-999 5-249 3-373 8-800	1028-05 1102-05 1402-05 1402-05 1102-05 1102-06 1102-06 1102-06	1% 4% 7% 4% 2% 17% 17%	9% 13% 21% 24% 31% (9%	हरी. चं.
27 57 113 226 453 403 1810	14 77 R 7 7 0	2 3 3 3 2 1 1		140 205 F48 77 10 0	. 61 10 . 30	PE		71-047 (B. eya 27-190 71-249 3-249 3-27-3 6 Mil 9-000 6-008	1,078-01 1,198-01 1,488-03 1,418-03 4,178-03 1,198-04	194 194 196 484 294 1754 1754	9% 13% 26% 24% 31% 49% 65%	हरी. चं.

Tatle 12c Beech 3 Teamport Capacity Under Larget Conditions

PFA: YEITERAPEN PFEEE IS AND CONTAINS

アグス・フロ けいしゅん ストストストストストストストストストストストストストストストストストストスト			UNIVERSELY A LIMICAL		pul l'article filse				-		
t huncel Width . w (m)	22 .		Manufag's a	0 055	Trien.	3M=4	LAIGAMINES.	Temperatur			
Ships 3 (m/m)	\$\$# 00 #}4		Plote (time)	30.5	(mm) . 5.	(mm)	it (mm)				
S efte f Permieter . I' (m)	33 4		Adv (m*2)	. 170	5.123	0.21	13.00%	15.00			
I tota Sethan Arra to WS . A (m*2)	17.6		(cnu)	367	B 25		13.00%	16.40 l			
Ity designe Badone . R (m)	94.0	-19	Ferrend Difference	-0.17	0.1	•	13,00%	16.49	e.		
treth of Keam = 1/1 A	b 79			-'([· ∗ [·	l	2	L) 00%	16.09	·, ·		
Acreleration of Charley - g (m'e')	9 81	2	Same Same	- 1	3	· • • • • • • • • • • • • • • • • • • •	10,00%	17.59	A_		
Prenanty of Water - this (\$4'm"3)	1000		TO MOTION Y STREET, TO	SARACH S	4	1	16,00%	20.10		-	
Red Sheat Sheer . Ih (Ps)	13.0		A4 (m/4)	(A) 100 (A)	1 .	16	8,00%	7.51	3		
frenchly of Sedmired - thee (hg/m"))	2700	- 35	Manual Trial 1	3.1	16 -	- 32		5 5 Sec.	•	Sept. 1	
Shout Velocity (11"k Vm(1)	9 10916	2.0	Minut (51 phy 10th	46%	32	. u	5.00%	100 6 34		· .	
handlan tie alse Blue - \$50 (mm);	47.		Mani (Fini's)		44 ***	12R	2,00%	2.30			
Percent of Bod a 1.4 mm	346	Salar a 😭	Toylgrand	. DP	774	236	7.00%	2.34			
Potront of Red of 2 0 mm	P14		Management.	<u></u> 44 }	216	512	2.00%	1.34			
Percent of Red 4 5 7 mm	15%						100.00%	*.34			
treeral of fied < 11 mm	1844			•			LON ON 14				
Careful at tith a bi toon											
PAPERS PHILIPPE INTO LONGACH PRAISTORS			12 18 642				For 2 year stone				
t"median	t's median	plá median	W*mv#lan	eb median	(20 lotal	Q6 lemi	Q# lebil	' ,			
(dimless)	(dimless)	(disalses)	(Simirer)	(m*2/s)	(101" 3/1)	(Pa/s)					
3 17E 07	1.768.01	1.37413	31 8.13867 ×		I 00	1.012101	(Temestry)	-			
317E WI	*******		1.1	2 %		1.01E101	B.338+03				
STREET, AST TROUBLE FRANCE STORY					jugas. Vijas		43				
Minimum	Mavimum	Cleametric				*	25.7				
Citain	I Armin	Menn	The second of	3	. 14	Purker	Parker	Parker	Potential	Particle	
Size	Size	of Cirola	100	· _0		Petential	Perticle	Patratial	Many	Pall :	Particia
	in Fraction	Sire in Freetin	a ('y ith flaction	phi .	11	Material	Yelecity	Volume	OH	Volenity	Surpended?
in Fraction	(wm)		or 4.1 and tamesood	ich Breffest	W4	hai may mayor	VI.	- Q54	M(red)*ik	WL	
<u></u>	0.25	(mm)	A STATE OF THE PERSON NAMED IN COLUMN			94 (1774)	. (MM)	413°W (W*34)	(halis)	(m/s)	[#1 > ひつこつ
017)	0.23		2.918-03	437.084	1.12.01	1,378-01	169 369	2018-01	211.38	0.014	Yes
0.21		0.6	1.5TE-04	317.401	1.18+01	(34E-62	188.417	2.99R-01	804 E2	0.063	Yee
0 5	1	0.7	3.148-01	164.383	1.12401	1.352-03	164.533	7.95E-01	197.50	0.000	Yet
, ,	,	1.4	4,78E-04	#1,934	1.4B+01	1.33E-02	162 U3t	3.892-01	720.04	0.123	No.
1	•	18	1,752.03	41,439	1.08+01	1.36E-02	155.647	2,748-01	145.65	0.177	No
	*	3.7	3,488.03	79 706	9.3E+00	1.152-63	142,076	2.52E-01	690.61	0.531	No.
•	16	H	4.95E:45	10,116	7.7R+00	9.54E-03	117.793	1.09B-61	364.31	0.333	
16	,12	73 .	9.358-03	3.243	5.2E+00	8.49E-03	79,098	1.408-01	378,93	9.502	H.
, u	64	- 45	1,968-02	2.653	2.12100	2 388-03	31.635	3.618.02	151.30	0,705	**
4+	178	5-5- 71	3,518-02	31313	第.3克-02	J.14E-04	1,608	2.30E-01	6.74		N-
17k	256	1A1	7.726.01	0.564	7.42.06	9.124-09	9 908	3 006-01	9.74	1.00)	Ho
756	517	362	1,35E-01	0.353	3.18-00	3.858-17	0.000	\$.44E.23		1.419	N.
			4.1					W-47B-E1	* 00	3,506	No
1 leam-tric											
Atron			Perker	Parker					34 of Bel		
of Firein	Primary	Tribulacy	Refullme	l'atential			•		Prime		
Sur in Fraction	Input	1=pet	- Marrament	Margenest	Culput	haffioget)	Brokesi	ment's sleeky			_
(mm)	(formerlys)	(Lowestyl)	(K ₁ / ₂)	(Consumpty)	(Temperity)	(Tayman'ya)	(lamera/yr)	QVVI		Consulative	
0.7	14	10	Sapended	Inspended	41	17.2.2.1.1	Surpended		in Median	* in Bed	D50
0.4	24	16	Surpended	Superior	41			Surpended	Smpraded	914	
01	24	ld	Soprided	Servadel	41		Supended	Scopended	Suppoded Supraded	#14	
16 .	74	16	110	206	41	:	2mpanded	Swimmied		9%,	
7 #	ıa	ii	746	197	31	•	48.541	7 148-03	574	316	
. 47	\n	20	GR).	100	30		31.143	2,792-05	416	3%	
ir t	n		344	149	. 19	7	46.637	4 075-03	7%	15%	
17.6		ī	379				様みい	1.018-03	3%	1874	
413			152	100	, 16	•	15.303	7.758.03	44	22%	
41 5 40 5	:	Š	132	49	्री•़		2.910	3.56F-05	6%	28%	87
	•	í		3	A.		1,700	1.44R.64	24%	17%	
181 6	b	3		. 0	9	3	6.001	1.44E-04	*74%	76%	
, 1610	v	,			• *		\$.50b	1.448.01	34%	100%	
			Total 1301			Total 3 8	Th Cap theed: 19		• • • • • • • • • • • • • • • • • • • •		
•											

Table 124 Reach 4 Transport Capacity Under Target Conditions

											•
FF ACTUALIS AND IN SESSION TO ADDRESS OF THE							Sin				
Channel Width - w (m)	2013		(WORKERS COM	Land .	P						
Tope S (man)		11	Mundings		legal Public	k Jiser	The state of the s				
Watted Permeter (* (m)	100	614	Now (unit)	D 03\$	leghts	. mex	is ib.				
Canta Santon Anna a term in a	3	11.5		_ es. 41.∰%:	(1995)	23.4 (1)	Laterorale	Tange n'ye	. [
Cont Section Area to WS - A (m'2)		91 ∴	An (m/2)	J##	0175	(mm)	. (me)				
Hydraulic Dadine - R (m)		17	j jun (com)	40.0	021	# # # # # # # # # # # # # # #	13.00%	4.04	ſ		
listif of Scott = 113 R		110 11415281	Percent Differe	M 0.41		0.5	13.00%		1		
Acceleration of the wity - g (m/s*2)			. e g Mare		1.5		13.00%	4.06_			
Dennis of Water . tho (bg m-1)		TI STATE	-		3 S L &	2	13,00%	4.06	1	:	
fied Sheer Misse - th (Pa)		ong C	IPOTOTALY AND	4	1.30 T			4.06			
Pennty of Sediment - there (kg:m=1)		10 (300)	Adr (m(*2)				1004¢	3.13			
Shest Velocity (11%)(m/s)	21	l 0 0		, N.		14	14,000	£.50	1 2 3 3 4 4		
Afedien Grafe Stee .450 (mm)	0.130	6 9 - (€€\$-*-	Bland Lines	1.9	16		4.00%	1.87			
Process of the same of the sam	5	1)	Marri (H. 16) HI	4 30%	× 32	33	5,0016	1.56		mas jila wa	
Percent of Bed e 6 mm		% A.	Man (Shirty)		64		1.00%				
Frerent of fled a ? # mm			Prophysical I	71		128,000	2.00%	1.56	100		
Frieral of Brd a 5 Tmm			- Marianana II		7 IN	738	7.00%	0.61	. 1		
Ferrent of Red o () with	5 Kar . 184	W S		10	* \$56	511		0.62	1		
	. 241	%			k		2.00%	9.62	ſ	•	
PARTER Mentalmana.		1					100.0014		1		
PARTIES FOR THIS TOTAL REPLEAD TRAN	YOU T		* * * * * * * * * * * * * * * * * * *	68. 77.20 x					j		
1"median	I'r median	4.			Ÿ.						
(dimfect)	(durdess)	phi median	W*melia.	gle median	er Stronger	n	. For 2 year storm	5			
4 A 12 02		(disslay) :	(dinate)	2.5	Q5 lotel	· Q6 lotal	A Last Marie				
	3 76E-07	1.1903	200	(M'76)	(Pr \$4)	(turb)	Op print				
12 (23) SPR of ARR DE ARROWS		1171.73 5 899.654	5.77	1.160.04	# O)		(Temps p/ys)				
PERSONAL CLASS TRANSPORT CALCULATE	UN'S	4.1				1.048+91	E.972701	•			
Pilitelinedis	Afazimum,	- A			iji ser	1	7.5	. 4			
Chiping	Circuin	(Jesenstyle)	* 44		XX	1.3	1,79	*, .		_	
Size		Mem 🗐	7 7 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		¥ .	Parker	March	10 July 1985		-	
en Fraction	Stre	of Circuit.	#3	92 - XX (N	Polential	Parker	Parkey	Patrolla		
(mm)	in Freetion	Sico in Praction	14 DL 16 000	mMi	gy Sen i rys	Movement	Partials	Potentiat		Portfelle	
	(mm)	(mm)	I's ith Bection	ith fluction	W#		Velocity	Volume	Men	Page 1	Particle
0 175	0 73	-	2872	Zw		Jun Well william	N ,	O4	Q►i	Velocity	Swepands 47
0.54	0.1	01	F. (4) 4)	799.463	10.00	4pt (**3y)	(m/lei)		Qbi(vob) Ma	w W,	a substitut à
01		0.4 ****	1.22E-Da	376 69g	(i,iEig)	1.012-01	343,745	44, a (14,14)	(Ca/1)	([=/1]	
1	<u>.</u>	0.7	1.448-04		10:41:1E	1.436.02		0.048-01	1616.04		(WI > HoFL)
•	2	14 643	4.45E.pa	199.175	A.IKIO	1.078.02	244,141	6.03@400	1628,43	0.011	Yes
	4	2.00		180 803	1.58+01		340,965	3.90g-01		0.043	Yes
	•	5,7 34.04	9.660 OL	20.510	1.6数161	1.786-02	334703	3.07E-01	1653,43	7.00y	Yes
•	16	11	1.778.0)		9.68.180	1.71B-02	317,500		150) 61	0.125 -	
16	32		1.0)在例果	#2,452		1.598-01	299,379	3.63E-61	1526 07	0.177	No
17	51	7)	7,448-05	6.353	2.3E+00	1.36H-82	256,780	5.24E-01	1415.95	0.251	Na
64		6. %	1.12(6)		# 65 + 30	9.018-03		4.508-01	1215 ng		No
130	128	अ ∴ ે ∾	3.03E-42 F	3/141	7.9E+00	4.438.63	186.749	3 26g-ol	BR(, 3)	0.335	Na
	116	14)		1.602	A 38-0)		90.909	1.598-01		9 502	No
256	513	Jaj	40160	o por	1.12.00	7.169-04	13.031	2.43E-01	430.18	0.709	No
		- Mar	1.100.00	0.400	1.72-01	1.792.07	0 003		65.54	1,003	Ho
Grameltie				3	4 'AE-CE	3.218-11	7.000	5.92R-06	0.03	1.419	
Mran			**************************************	¥ dan			*	1.06g.og	R.CO	2.004	N=
			Burne 1 30 500	20 *			5.7 ± .	* - 1		4. 40	No
of Chain							7.7				
of Chain Sure in Ference	Crimary	Tributary	Parker 72	Puter	er en e			•			
Sure in Fraction	Crimary Imput	Tributary Insur	Relettes	Potential				•			
Sur in Fraction (mm)	Imput	Seput	Releibus Morganist	Potential	Charles .			•	Wolflief		
Sur in Fraction (mm) D 2:	Imput (Tomnes'ys)	(Tonnes/yr)	Relative Marquipped	Paternies Movement	Origot	Departed		: : :: :: :: :: :: :: :: :: :: :: :: ::	From		
Sur in Fraction (mm)	Imput (Tottnes'ys) 41	(Tennes/yr)	Reletive Mercyanged (Refe)	Patential Macroscopi (Fermin's)	(verter)	Deposited (Tetorolys)	Brilloud	mustraleuky.			_
Sur in Fraction (mm) D 2:	Imput (Former'ys) 6] 4†	(Tonnes/yr)	Relative Management (Rate) Surgential	Palentiaj Movembra (Pittorialys) (Respondaj				mustral sulty	From Particips	tendiçiy Min te s	Appena
Sure in Fractions (inm) 0 2 0 4 0 7	Jopul (Former'ys) 61 4† 41	(Tennes/yr)	Reletes Mergagga (Kath) Sagandal Burgadal	Patentiaj Maromoni (Temeroji) Respendist Respendist	(verter)		Brilloud (concerning) Suspension	Q/YI	From Porticitys in Mulipu	Win Bed	Арриоц 1930
Sue in Ersetion (imm) 0 2 0 4 0 7	Impul (Tormes/ys) 41 41 41	(Tomacziye)	Relative Maryanga (Kap) Suppoded Suppoded Suppoded	Palentiaj Movembra (Pittorialys) (Respondaj	45		Brilloud	Subseque Color	From Participa in Matipa Juopended	M in Bed	
Sue in Fraction (nim) 0 2 0 2 0 7 1 4	Jopul (Former'ys) 61 4† 41	Imput (Tonnesiye)	Relative Mercycogal (Kath) Sugarated Patyroded Sugarated 1781	Patentiaj Maromoni (Temeroji) Respendist Respendist	45 45 45 45	((Internity)	Brilloud (concerning) Suspension	OFYI Proposedal Proposedal	From Particlys In Matiga Inspended Despended	Win Bed	
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Table 17g Reach 7 Tourspeel Capacity Under Turget Conditions

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Wetted Personatur . P (m)	01	00101	Plane (cres)	79 1	_ ===	And N	Percentate		1		
Cress Section Ates to WA . A fee 21	4845 [1]	28.2 °	Adr (m*2)		[(mm)		(Piiii)	Teenery	' '		
llydraulie Rudius - R (m)	and the state of t	47.5	Flow (ema)	Page 3412	0.175	0.25	- de 13.00%		1		
Depth of Scott = 1/3 R		1.60	Personal Differ	## 89.4 1	9.23	. 1878/1885 0.5	11.00%	13.12			
	อร์สิทธิ์ สิทธิ์	U 38		4 17	. 0.5		43.00%	13.12	[4]		fir . •
Acceleration of Charity . g (m/2/)} [Pennity of Water - the (Laim?3)		J.81	2 22 - 32	4848 E. Zal (19)		346 - 10 C	23.00ts	13.12		*	
Dad of A mater - the (pales 2)		1000	Andrew Commencer of the		3000 T	and the state of t		43.12	sgrift in 1885.		Day Barrey
Red Shene Street - 16 (Pa)		167	TRIBUTARY DE				10.00%	10.09	11 L	28	
Dennity of Sediment - thes (Lytin*)}		2100	Adr (mi*?)	Ħ			\$ 14.00%	76.15	" [475	1000
Shear Velocity (II*L)(m/e)		5167	Mand They's		100 J6	(#XX 15	5.004	6.01	4.4		
Aledina (Irein Sise .450 (mm)		15	Marel (M ales)	Phg 42%	0 € D2	i Silani 🛶	3.00%	3.03	1	4.5	
ferrul of Red = 2.4 mes		1844	Morel (Time's)	1.1	1 2 5 24 5	174	1.00%	3.05	1		
errent of Red < 1.8 mm		3%	Harkprand ?		J20	256	2,00%	7.03			
errent of Ned < 5.7 mm		6%	Managagaga	OLE BES	236		2.0054	2.07			
erreal of Bed a mm	1 71 11 .	14%			i	312	2.00%	2.02	i		
4,05,94 +4	and the second second	4					100,00%				
APPER POHATION FORMS BETTERAN SPANNIN	18.7	N -									•
f*median 120 22 35	1°t mediun		743				-				*
(dimlers)	(dinives)	PM_mrailes	W*median*	qb medlag			For 2 year storm				
6 902 03		(dimless)	(fimters)	(m^2/s)	Q6 telul	Q6 lotal	Qh tunu				
1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	3.74E-03	4.0333	0.323.0		<u>(=')/i)</u>	(kg/r)	(Townsu/yr)				
ACH NER FRANC TRANSFORS CASE TRANSFORM				1.008.04	0.00	7.14E100	4.18¥*85	•			
Muimon					e de la companya de la companya de la companya de la companya de la companya de la companya de la companya de	1. A 1. A 1. A 1. A 1. A 1. A 1. A 1. A	H-DWG-WE				
(Trains	Marin ma	[from early									
Size	Orain	Меня		Your 400		Parker	Puker				
In Fraction	Sira	of Chain				Potential		Parker	Potential.	Particle.	
	In Freetien	Mes in Practice.	10-11-0	, pN		Movement	Particle	Potential	Hen	Fell	
	(mm)	(mm)	ter ith fractions	ith Anethou	W4	Pet walt with	Velocity	Volume	OM		Partiels
0 33	9 25	0.1					. •	Q64	Member	W	Surpended?
0'15	0.5	9.4	4.71E-04	146.629	i.ikioi	1.418-03	(m/hr)	<u> 461°w (m</u> *3/s)	(0e/r)		
0.5 (《漢文》: (2)	1.00	0.7	9.378-D¢	73.620	1:12101		9.052	3.748-02	101,91	<u>(4-7)</u>	(Wo > U'L7
	3		1.37K-03	36,961	1.02401	1.316-03	8.826	3.43E-02		0.011	Yes
* . X 12 43 2 10 1 1 1		78 14 37	3.71E-05	18.359	7.1E+00	(0-S1C.)	8390	3.478-02	PR. 50	B 963	Ne
		20. 微 整 法、	7.412-03	9.318	7,72000	1.14E-03	7.372	3.13H-02	73.63	0.019	No
	16	3.7	1.416-01	4.678		9.5eg.pr	4.127		81.49	0.175	Ne
16			1.4841	1.149	4.75+00	4.07E-01	3.89	2.338.07	48.17	0.177	Ne
9 4 5 6 7 7 7 7 7 7 1	4. 32	- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1	3.858.02		1.62180	2.088-04	1 337	1.0 Bib.t	~ 43.43	0.231	No
64	54	() - 본위:44 [작년	1.178-01	1.179	3.4E-02	1.06E-06	9.020	J.52E-03	14 93	0.355	Ho.
172	ii 178 ii j	91	7.32R-01	\$ 0.591 ji	1.65-06	2.11E-10		#.11E-05	0 22	0.302	No
294	256	ter		0.197	1.72-09	1.538-13	0,000	5.372-09	0.00	9,709	
**************************************	343	362	467E-0[**	10 m 10 m 10 m	1.7E-11	7.22E-11	₩.000	4.0725-12	0.00	1.003	Me
			7.14 8-8 1	0.073	1.02-12	2.278-16	0.000	3.00E-14	0.00	1.419	No
Ornmebile	F1 + F1 (4.19)				4 FT	4.478.18	6.000	6.01 E-15	0.00	3,006	No
Mran					•	3.				3.000	No
of Chrain	Primary	Tributary x	Parker 🐔	Puter		1.37					
Size to Fraction	Imput		Reletive 5%	Polantial		<i>34</i>			16 of Bed .	· .	
(mm)	Toures/31)	المساور المساور	Maramad	Movement	Output		, Na		Prom		•
0 2	6A	(Tennes/p)	(K _B /t)	All the second second	Tennica/ve)	Deposited	Brillian	mem'velocity			
0 6	43	8) B 3.	C. Personale Long C.	Superded		(Townsofy)	(lonners/yr)		Putteles ,		Approx
07	6 1	13	94	191	St. 🚹 💥	en en en O liveria	Superded		n Moden 1	in Bed	D10
14 13 13 22 33 33 33		13			81	#####################################	P0.674	Superided	- Spender	014	
2.0	48	in the second	84	14)	S 🖣 📜	9,5%, ● 58,6%	20.574	I.FIE-03	#15 ·	F4 3	무슨 글 등
57	52	. IØ		129	NI .	N 40 🐞 1967 -		1.105-03	. 6%	f2%	
Ha Alexander	69	16			. 67		80.674	1.22%-01	714	11%	eta di kari
72.6	16			67	67		67.057	1.168.07	6%	11%	
	1	•	17 (S.C.)	2)	23		66.337	1.938-03		36N	
90)	17. 0			ng • Migik	•		\$2.254	1.958-95		4616	
							03)6 🔅	1.938-03			45
1810	D	2				사람들 그래요	_jng 0.000 (135)	1.93년-03		57%	4.2
1670		•	 Chick 	•	` .	이번 📱 사람이	4.000	1.958.03		49.4	
		- · · · -		 6 (1) (1) 	_	inga 🏗 i	0.000	1.918-01		79%	v t
			Total egg		- -	1	9.000	1.95B-05		1976 	
			A 18 18 18 18 18 18 18 18 18 18 18 18 18	1.97%	and the second	Total 44,2	N Cap Used 38%		11% 1	00%	